Digitized by the Internet Archive
in 2013

http://archive.org/details/resourcebulletin5265nort

GOVT. DOCUMENTS
DEPOSITORY ITEM
NOV 16 1977
CLEMSON
LIBRARY

The TIMBER INDUSTRIES of MARYLAND

CLEMSON UNIVERSITY LIBRARY
NOV 29 1977
SCI., TECH. & AGR.

by James T. Bones and John E. Brodie

FOREST SERVICE RESOURCE BULLETIN NE-52
1977

FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE
NORTHEASTERN FOREST EXPERIMENT STATION
6816 MARKET STREET, UPPER DARBY, PA. 19082

THE AUTHORS

JAMES T. BONES, Research Forester, received his bachelor's degree in soil conservation from Utah State University in 1952, and his master's degree in forest management from the same university in 1956. He worked at the Pacific Northwest Forest and Range Experiment Station and the Institute of Northern Forestry until 1965, when he became a United Nations Forestry advisor to the government of Colombia in South America. After his return in March 1968, he transferred to the Northeastern Forest Experiment Station. He is now stationed in Upper Darby, Pa., where he is working in the timber-removals phase of forest resources evaluation.

JOHN E. BRODIE, Forest Products Utilization Specialist for the Maryland Forest Service, received his bachelor's degree in forest management from the University of West Virginia in 1962. His first duties with the Maryland Forest Service included strip-mine rehabilitation and other forest management tasks at the Service's regional headquarters in LaVale, Maryland. In 1964, he began to work in the forest products utilization field, assisting local wood users in western Maryland. In 1972, he transferred to the Maryland Forest Service headquarters in Annapolis, where he is in charge of forest products utilization programs throughout the State.

MANUSCRIPT RECEIVED FOR PUBLICATION 24 JUNE 1977

Cover Photo

Currently in Maryland the trend is to harvest the entire bole and transport it to a product breakdown point before primary manufacture. The cover photo shows a Dorchester County hardwood operation that stresses maximum grade and product recovery by channeling each segment of the tree stem to the best possible use. The current product mix includes factory lumber, ties, timbers, pallet stock, and pulp chips.

The TIMBER INDUSTRIES of MARYLAND

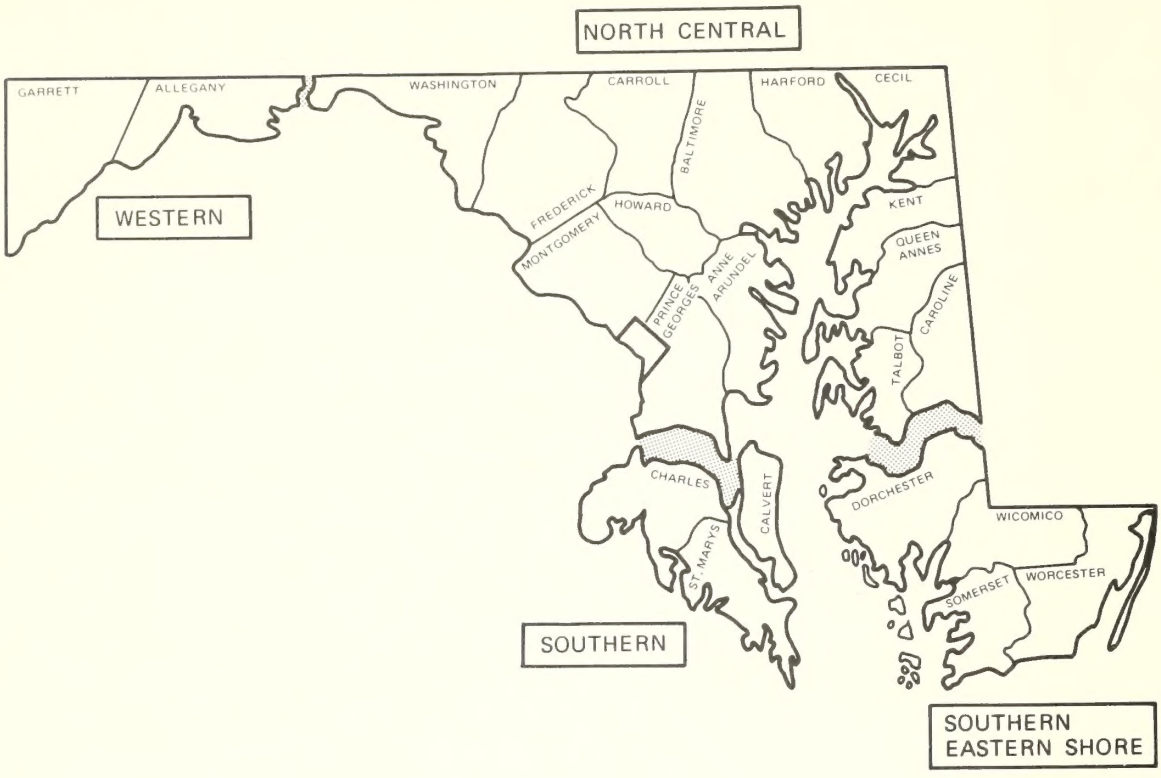
ABSTRACT

A periodic evaluation of statewide industrial timber output based upon a complete survey of the primary wood manufacturing plants in Maryland. Contains statistics about industrial timber production and receipts in 1975 and the production and disposition of the manufacturing residues that resulted. The 43 million cubic feet of industrial wood produced in 1975 represented a 25 percent production decline since 1963 when the previous survey was made. Pulpwood and veneer log production, however, increased between 1963 and 1975. Other trends in industrial product output and manufacturing residue use are presented along with 20 statistical tables.

CONTENTS

HIGHLIGHTS 1
BACKGROUND 1
CURRENT INDUSTRY TRENDS 1
INDUSTRIAL TIMBER HARVEST 2
LUMBER AND SAWLOGS 2
PULPWOOD 5
OTHER TIMBER PRODUCTS 6
  Veneer logs 6
  Piling 6
  Miscellaneous 7
MANUFACTURING RESIDUES 7
REFERENCES 8
INDEX OF TABLES 9

The geographic units in Maryland.



Round timber conversions for major products:

Softwood logs: M bd ft (Int. 1/4-inch) = 167.9 ft^3 = 4.76 m^3
Hardwood logs: M bd ft (Int. 1/4-inch) = 151.0 ft^3 = 4.28 m^3
Pulpwood: 1 Standard cord = 85 ft^3 =2.41 m^3

HIGHLIGHTS

THE 1975 timber industry survey in Maryland showed that since 1963:

- Total timber output has decreased 25 percent to 42.6 million cubic feet.
- Sawlog production has declined 36 percent to 153 million board feet.
- Pulpwood production has increased 27 percent to 165 thousand cords.
- Veneer log production has increased 42 percent to 22 million board feet.

BACKGROUND

The Forest Service of the U.S. Department of Agriculture conducts continuing forest surveys of all states to provide up-to-date information about the timber and other related resources of the Nation. In the 14-state region served by the Northeastern Forest Experiment Station, all states have been surveyed at least twice. Maryland has now been inventoried for the third time. The latest survey included a timber industry survey to determine the output of timber products and the volume and disposition of primary wood-product manufacturing residues.

This report is the result of a 100 percent canvass of all primary wood-product manufacturers that were operating in Maryland in 1975. Pulpwood production data were gathered as part of the Station's annual survey of pulpwood producers in the Northeast. As part of the licensing procedure for timber operators in the state of Maryland in 1976, operators were asked to furnish information about their 1975 round timber output. This information was compiled and merged with data from other ongoing surveys. The authors thank the Maryland timber operators for their excellent cooperation and the personnel of the Maryland Forest Service who assisted during the survey.

This report deals for the most part with statistics for two years: 1975, the calendar year of the current timber industry survey; and 1963, the calendar year of the previous complete canvass. The reader is reminded that these years may or may not be representative for the various Maryland timber industries covered in this report. When documented production statistics were available for individual timber products for previous or intervening years, they were included for comparison.

Long-term production trends may be indicated by repeated surveys in the future. Until a data base is built up over time, the reader is cautioned to use the current statistics prudently.

CURRENT INDUSTRY TRENDS

Maryland is fortunate to have such a wide variety of product alternatives for its timber. The softwood resource—mostly southern pine—can be used for poles and piling, or converted into lumber, plywood, or wood pulp. The hardwood resource can be used for cooperage logs, veneer logs, and handle stock, or converted into lumber and wood pulp. The most pressing problems confronting the forest industry interests of the state relate to improving the recovery and utilization of the existing timber resources and providing for future industrial expansion. Single-product harvesting operations, which typically leave large quantities of logging residues behind, can no longer be tolerated; both for financial and for aesthetic and environmental reasons.

Wood fiber that is left at the logging site actually has a negative value because it must be treated before the area can be regenerated. The same material at a concentration yard or mill site can be utilized, even if it is only suitable for firewood or boiler fuel. As the energy crisis continues and new technology is developed, the forests will be used to a greater extent as an energy source.

On the Eastern Shore of Maryland, tree-length logging of pine has increased the amount of wood that is removed and utilized. Multiproduct logging in hardwood stands has also increased the product recovery. Total-tree harvesters are operating in several parts of the State. These machines are capable of increasing per acre yields by 50 to 100 percent over conventional harvesting, by chipping tree tops and rough, dead, and small-diameter trees that

would be left behind in conventional logging operations. In addition to local pulpmills, new markets are being located for these chips. The chips are currently being used at an experimental waste treatment plant near Beltsville, Maryland, to provide aeration during the composting process. These chips should also be suitable as metallurgical wood or charcoal.

Primary manufacturing plants are striving to raise production levels and at the same time lower unit production costs. But these improvements require large capital outlays for the latest automated production equipment. Large edgers that employ a greater number of saws with narrower saw kerfs are being installed in Maryland sawmills. Scragg mills are being employed to process small sawlogs more efficiently. In many cases, headsaws are being used to square two sides of the logs only, before they are passed to a system of edgers for final breakdown into lumber, dimension, and cants.

The average sawmill operator in Maryland is becoming increasingly conscious that the product he produces must be well manufactured and that he must maximize the product recovery from each sawlog he processes. Growing demand for bark, sawdust, and chipped residues has allowed him to supplement his normal income.

INDUSTRIAL TIMBER HARVEST

Forest industries used over 42 million cubic feet of timber from the forests of Maryland in 1975. Almost 58 percent of this volume was from hardwood trees. Sawlogs were the major timber product, accounting for slightly more than 55 percent of the total harvest in Maryland. Pulpwood production ranked second in volume, accounting for 33 percent of the total. Other timber products that made up a minor portion of the harvest were veneer and cooperage logs, piling, poles, posts, mine timbers, and handle stock.

Overall, the timber harvest in Maryland has decreased 25 percent since the last industry survey was made in 1963, and 19 percent since 1952. Even though the production of most products declined between 1963 and 1975, two products showed substantial increases: the harvest of veneer logs and pulpwood increased 42 and 27 percent respectively.

These production gains were due entirely to an increase in the use of softwoods for pulpwood and veneer. The softwood harvest for pulpwood increased from 5.8 million cubic feet in 1963 to 8.8 million cubic feet in 1975 and the softwood veneer-log harvest increased from 200,000 cubic feet to 2.8 million cubic feet. The veneer log production was stimulated by the establishment of a softwood plywood plant on Maryland's eastern shore in 1967. This plywood plant is the only one using softwoods in the Northeast.

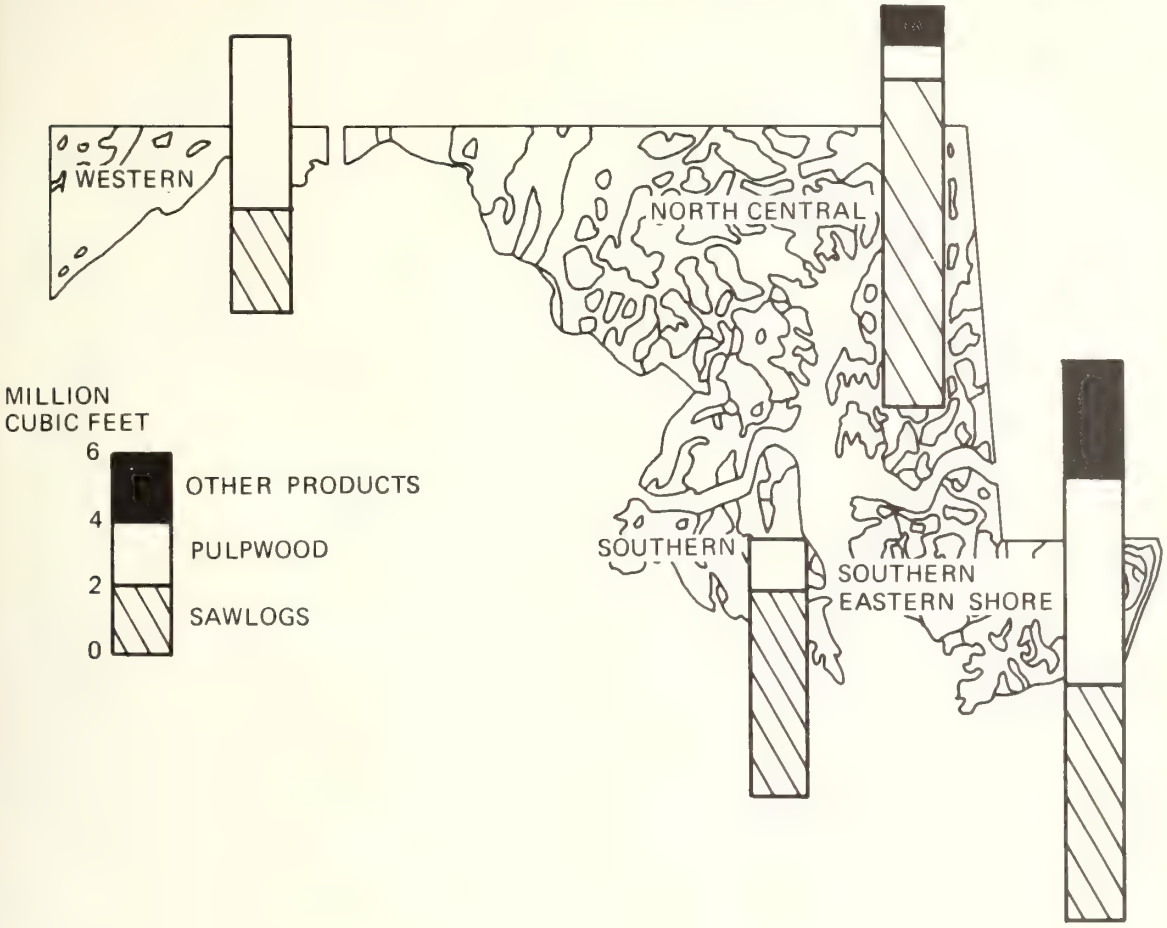
In 1975, most of the industrial timber harvest came from eastern Maryland (Fig. 1). The 17 million cubic-foot harvest from the South Eastern Shore Unit represented 39 percent of the state total. Although the North Central Unit ranked second in volume harvested—11 million cubic feet—a greater volume of sawlogs was harvested from this unit than from any of the other units. The Western Unit had the largest pulpwood harvest from hardwoods; the 4.6 million cubic feet of pulpwood production was 89 percent of the hardwood total for Maryland. Charles County, in the Southern Unit, was the state's largest hardwood sawlog producer in 1975 (18.1 million board feet); Worcester County produced the largest volume of softwood sawlogs (11.5 million board feet).

LUMBER AND SAWLOGS

Maryland has never been a nationally prominent lumber producer, but lumber has always been a major product of the primary wood manufacturers. Since lumber production statistics were compiled in 1869 (Steer 1948), lumber production in Maryland has averaged more than 100 million board feet (Fig. 2). Production low points were recorded in 1917 (68 million board feet); 1928 (69 million board feet), and 1933 (80 million board feet). Peaks of lumber production were reached in 1909 when 268 million board feet were produced and in 1952 when 238 million board feet were produced. Since 1952 the trend of lumber production has been generally downward. On the basis of sawlog receipts, we estimate that 156 million board feet of lumber was produced in 1975.

The species distribution of lumber produced for several selected years shows (in million board feet) that loblolly pine and oaks have been

Figure 1.—Harvest of industrial timber in Maryland, by units and major products, 1975.



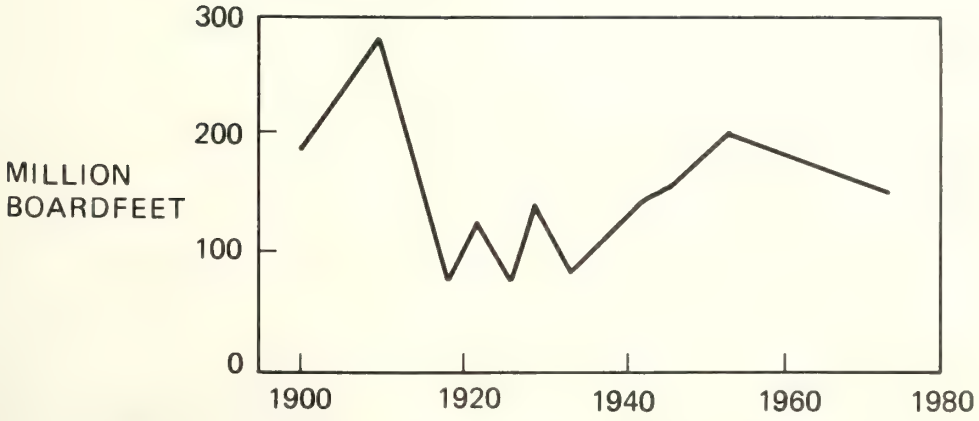


Figure 2.—Lumber production in Maryland for selected years.

the main species manufactured into lumber in the last century:

	1869	*1909*	*1916*	*1945*	*1975*
Yellow pines	40	98	29	72	31
Other softwoods	8	33	3	1	5
Oaks	40	72	17	24	59
Other hardwoods	8	65	20	19	61
Totals	96	268	69	116	156

In the early part of the century more than half of the Maryland-grown timber that was used by local wood-using industries was yellow pine and most of it was used in packing case and box construction. As the container industry began to use materials other than pine lumber in box construction, demand developed for pine poles and pine lumber in building construction. During the past decade, competition for yellow pine has been acute because demand for pine for such new products as plywood and pulpwood has augmented the traditional market for pine lumber.

Over half of Maryland's hardwood lumber production has been from oaks. Fifty years ago, large quantities of oak lumber were used for wooden tanks and silos, in auto and other vehicle construction, and in furniture and shipbuilding. Over the years, product requirements have changed. Other materials have replaced wood in the construction of vehicles, ships, and silos. Other hardwood species have been found equally acceptable for such products as furniture and railroad ties. In addition, the automation of the transportation industry has produced a growing new market for Maryland hardwoods in wooden pallets.

The number of sawmills operating in Maryland has closely paralleled fluctuations in lumber production. As lumber demand slackened and production dropped, fewer sawmills operated. During the first decade of this century, when a historic peak in production was reached, the number of sawmills operating in Maryland exceeded 700. Again during World War II when demand was high, many small producers began to operate; 704 sawmills were known to have operated in 1941. Between 1952 and 1975, the total number of sawmills in Maryland decreased from 495 to 91.

Even though the total number of sawmills in Maryland has decreased during the past 25 years, the volume of sawlogs processed annually by Maryland sawmills has increased (Table 5). In 1952, the average hardwood sawmill processed about 300,000 board feet of sawlogs and the average softwood sawmill processed about 800,000 board feet. By 1975, the average hardwood sawmill was processing about a million board feet annually and the average softwood sawmill was processing over 3 million board feet.

While sawlog production from Maryland forests decreased 20 percent—from 190 million board feet in 1963 to 153 million board feet in 1975—log receipts at Maryland sawmills decreased 22 percent. The drop in receipts was greatest in the Western Unit (38 percent) and least in the North Central Unit (8 percent).

In 1975, the North Central and Western Units were net exporters of sawlogs, while the Southern and South Eastern Shore Units were net importers. More than half of the sawlog volume harvested in the North Central Unit was shipped to other units of Maryland or other states for manufacture. More than 47 percent of the sawlog volume processed by sawmills in the Southern Unit was harvested in other units of Maryland or other states.

Statewide, Maryland was a net importer of sawlogs in 1975. About 11 million board feet of sawlogs were shipped to neighboring states for manufacture. Pennsylvania and West Virginia

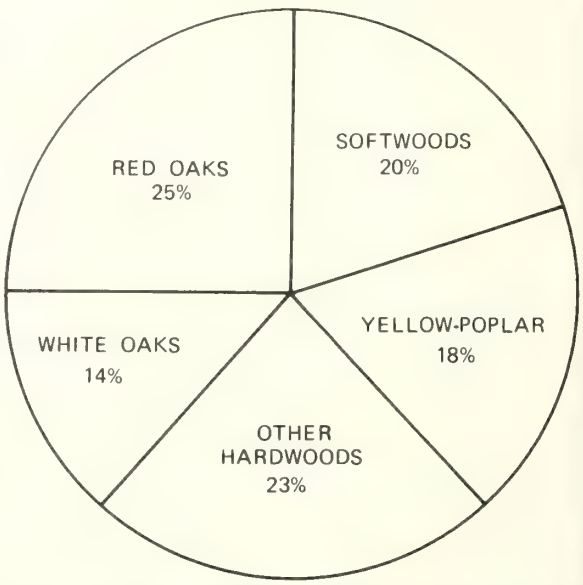


Figure 3.—Maryland sawlog production, by species, in percent, 1975.

were major recipients of Maryland sawlogs, receiving 5.0 million and 4.4 million board feet respectively; 14.7 million board feet of sawlogs were received by Maryland sawmill operators from other states. Delaware was the major out-of-state sawlog source, supplying about 8.0 million board feet in 1975.

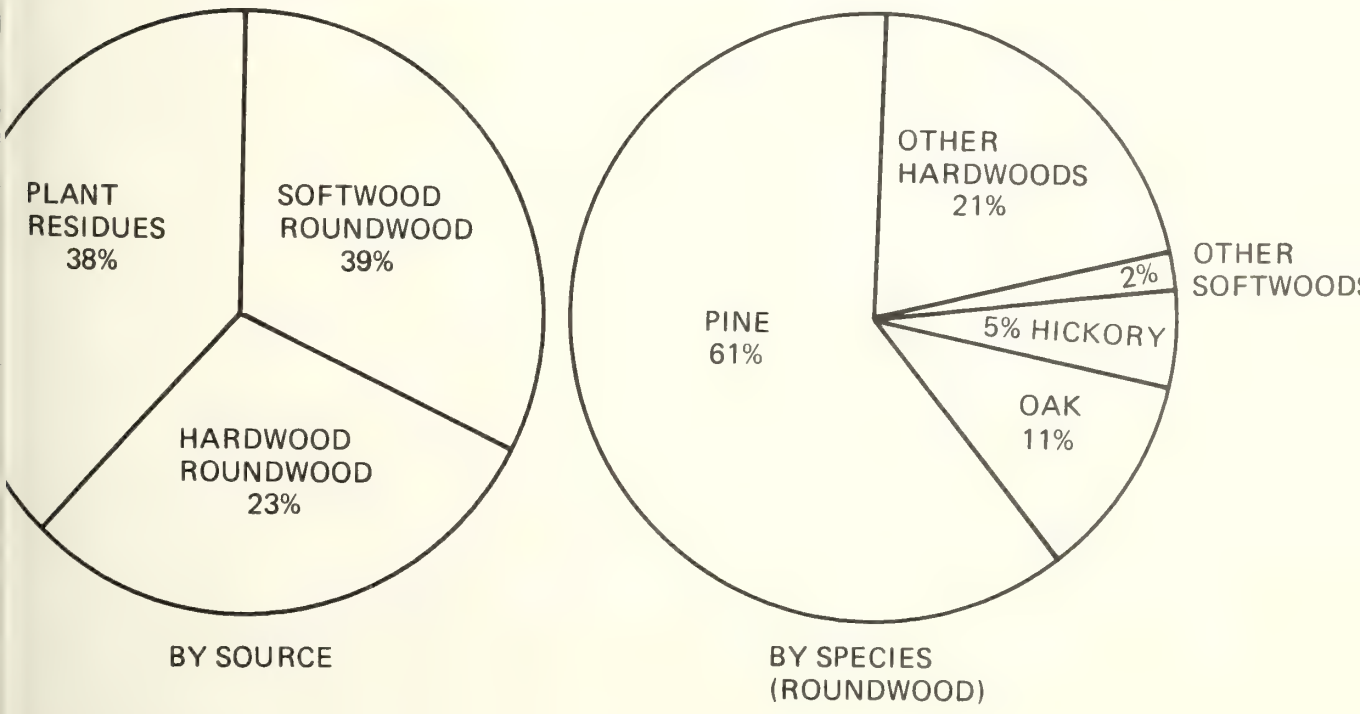
Eighty percent of the total sawlog production in 1975 was from hardwood trees. Red oaks accounted for a quarter of the total volume and white oaks accounted for an additional 14 percent (Fig. 3). Another important hardwood species was yellow-poplar, which accounted for 18 percent of the total production. Large volumes of soft maple and red gum were also produced. Loblolly pine accounted for 86 percent of the softwood production in 1975.

PULPWOOD

Pulpwood has been an important timber product in Maryland since the establishment of the State's first pulpmill at Luke in 1888. By 1914 Besley reported (1916) that more than 92,000 cords were being harvested; about two-thirds was Virginia (scrub) pine and one-third was yellow-poplar and red gum. Most of this pulpwood was harvested in the Southern Region and shipped to Virginia pulpmills. By the late 1940's the pulpwood harvest in Maryland had risen to over 100,000 cords annually and a floor-covering plant had begun to operate in Finksburg.

More than 165,000 cords of pulpwood was harvested from Maryland forests in 1975, and in addition, more than 100,000 cord equivalents of pulp chips were recovered from the primary wood-using plants of the State. This was a 23 percent decrease in round-timber production and a 31 percent decrease in chipped-residue production from the historic high levels that were reached in 1969. The pulpwood harvest from hardwoods has been decreasing for the past decade; from about 90,000 cords in 1965 to 61,000 cords in 1975. During the same period, the harvest from softwoods climbed from 65,000 cords in 1965 to about 132,000 cords in 1969, and then declined to 104,000 cords in 1975. Production of pulp chips from hardwood residues has climbed steadily during the past decade from less than 12,000 cord equivalents in 1965 to more than 45,000 cord equivalents in 1975. Pulp chip production from softwood residues followed the same pattern as the

Figure 4.—Maryland pulpwood production, in percent, 1975.



softwood harvest, increasing from less than 39,000 cord equivalents in 1965 to about 98,000 cord equivalents in 1969, and then declining to 56,000 cord equivalents in 1975.

In 1975, 39 percent of the production total came from softwood trees and 23 percent came from hardwoods (Fig. 4). Pulp chips from manufacturing residues accounted for the remaining 38 percent. Most of the softwood harvest was yellow pine and most of the hardwood harvest was oak and hickory.

During the past decade, 1.8 million cords of pulp timber was harvested in Maryland. Nearly three-fourths of the million-cord softwood harvest came from the Southern Eastern Shore Unit. The Western Unit was the most important hardwood pulpwood producing unit, accounting for 89 percent of the 0.8 million cord harvest.

OTHER TIMBER PRODUCTS

Veneer logs

Nearly 21.8 million board feet of veneer logs were harvested in Maryland in 1975. This is a 37 percent increase in volume since 1963, when 15.9 million board feet of veneer logs were harvested. While a rapidly growing yellow pine plywood industry stimulated increased demand for softwood veneer logs during the period, hardwood veneer-log production declined. In 1963, softwoods accounted for 7 percent of the total harvest; in 1975 softwoods accounted for 76 percent.

In 1916, basket makers were the seventh most important wood-using industry in Maryland. The 28 basket companies that were contacted during an industry survey in 1917 (Besley and Dorrance 1919) consumed 6.6 million board feet of logs, most of which was converted into basket veneer. Red gum was the favorite wood for veneer baskets, accounting for 70 percent of the total plant receipts. Eighty-five percent of the red gum was harvested from Maryland forests.

Over the years, as the demand for wooden baskets declined, many basket plants stopped operating. By 1963 only two of the five hardwood veneer plants operating in Maryland were producing baskets. Even so, red gum accounted for 21 percent of the veneer-log harvest in Maryland because the State's two face-veneer plants were importing large volumes of foreign woods.

The following statistics show how the number of plants, and production and receipts have changed in recent years:

Year	*Operating Plants (Number)*	*Production (Million board feet)*[a]	*Receipts*
1963	5	15.9	8.1
1968	4	32.4	29.2
1972	3	26.7	30.1
1975	3	21.8	27.6

[a] International 1/4-inch rule.

In 1975, two face-veneer plants and a plywood plant were operating in Maryland.

Piling

Most people think of piers, wharves, and waterfront structures when pilings are mentioned, but pilings are also used for supporting foundations of heavy structures and bridges. Equally important is the necessity of replacing damaged and rotten pilings that are already in use.

Pilings are in continuing demand along the seashores of the Northeast, and much of this demand is satisfied from Maryland forests. Few logging operators in Maryland specialize in cutting pilings only, because the trees most suitable for pilings are scattered throughout the timber stands. Most operators sort out the pilings at the roadside, or at a concentration point, because pilings are more valuable than sawlogs or pulpwood.

Only 2.9 million lineal feet of piling was produced in Maryland in 1975. This volume represents a 61 percent decrease from the 7.2 million lineal feet produced in 1963. During the past quarter-century piling production in Maryland climbed from 3.1 million lineal feet in 1951 to a high of 12.6 million lineal feet in 1968, and then declined to current levels.

In 1951 the Maryland piling production represented slightly less than half of the production total for the Northeast (Ostrander 1953). Eighty-two percent of the volume was from yellow pine and 16 percent was from oaks. In 1975, 88 percent of the piling was yellow pine.

A report on pilings handled by northeastern wood-preservation plants (Phelps and Gill 1969)

attests to the importance of Maryland as a producer of pilings; more than 56 percent of the piling receipts in 1967 were from Maryland.

Miscellaneous

Over the years many different timber products have been harvested from Maryland forests. In addition to the major products already mentioned, such products as poles, posts, cooperage, mine timbers, and handle bolts were harvested in 1975. In total, about 405,000 cubic feet of timber was harvested for these wood uses.

Three cooperage plants were operating in Maryland in 1975; one producing slack cooperage from pine and two producing tight cooperage from white oak. In addition, white oak cooperage logs harvested in Maryland were shipped to two neighboring states for manufacture.

Besides utility poles, fish-net poles, and barn poles, furnace poles are frequently produced in Maryland. Fish-net poles are used by local commercial fishermen to support pound and gill nets. Demand for these poles varies with weather conditions and the amount of commercial fishing activity. Barn poles are used in pole barn construction and to support curing tobacco. Furnace poles are used by local copper refining plants. When the green poles are inserted into molten copper a chemical reaction takes place that removes oxygen and other impurities from the copper. Approximately 50,000 green hardwood poles were being used annually in Maryland in the 1950's; only 2,500 were harvested for this use in 1975.

Although no handle plants operated in Maryland in 1975, handle logs from Maryland were shipped to other states for manufacture. Ash and oak were the preferred species.

Wherever underground mining is done, locally cut mine timbers are employed for shoring and bracing. The wood requirement relates directly to the quantity of coal produced from underground mines. In 1975 about 15,000 hardwood mine timbers were produced in Maryland, most of them in the Western Unit of the state.

MANUFACTURING RESIDUES

Woodpulp mills, charcoal producers, poultry producers, and other industries that depend upon inexpensive sources of wood are becoming increasingly dependent on primary manufacturing residues as a major source of raw material. Stringent enforcement of air and water pollution laws and efforts by industry to become energy efficient are also making open burning and dumping unacceptable for residue

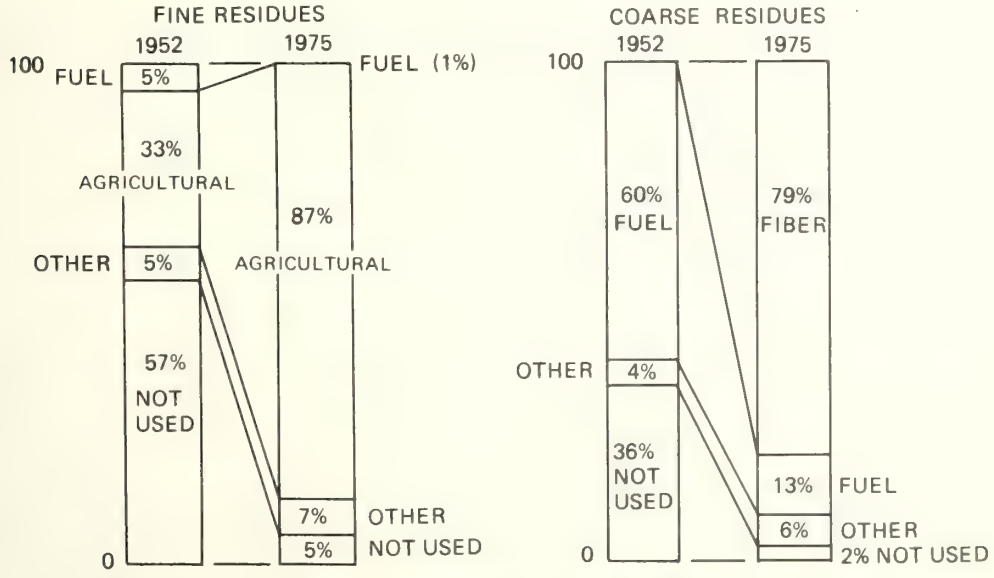


Figure 5.—A comparison of wood residue uses, 1952 and 1975.

disposal and encouraging manufacturers to seek uses for residues.

About 26 million cubic feet of residues were generated by primary wood manufacturers in Maryland in 1975. Fifteen million cubic feet of this total was woody material and 11 million cubic feet was bark. More than 8 million cubic feet of the wood residue material was suitable for conversion into chips for fiber products. Ninety-six percent of all residues—25 million cubic feet—was recovered and used.

When the results of the 1975 study in Maryland were compared to a similar study (Simmons and Bond 1955) made in 1952, some important changes were identified (Fig. 5). In 1952 the major use of fine wood residues was for agricultural purposes. Normally the farmer picked up the sawdust at the plant and used it first for animal bedding; then spread it on his fields and incorporated it as a soil amendment. Other documented uses for fine residues in 1952 were as landfill material and in school jumping pits, as a component in firebrick, as a base for floor sweeping compounds, as a sidewalk de-icer in winter, as insulation in ice-making plants, and as floor covering in slaughterhouses and old fashioned barrooms. In 1975 most of the fine wood residues were being used by Maryland's thriving poultry industry.

Nearly 100,000 cords of coarse residues were used as fuel in Maryland in 1952, either at the producing plant or hauled away for use by others. On Maryland's Eastern Shore, most of the pine slabs were given to the mill workers for fuel. Around the Baltimore and Washington areas, hardwood slabs were in great demand for stove wood. None of the coarse residues were used for fiber products in 1952 because debarking equipment was too expensive for even the high-production mill owners and the pulpmills would not accept unbarked residues. More than a third of the coarse residues were not being used.

In 1975, pulp chips were the major use for coarse wood residues. Pulp chips from Maryland primary manufacturers were shipped to eight pulpmills in four states.

Bark residue use was high in Maryland in 1975. The 11 million cubic feet of bark that was recovered and used was 96 percent of the total available. Most of the pine bark was processed and sold as horticultural mulch; most of the hardwood bark was converted into charcoal.

REFERENCES

Besley, F. W.
1916. **The Forests of Maryland.** Md. State Board For. Baltimore. 151 p., illus.

Besley, F. S. and J. G. Dorrance.
1919. **The Wood-Using Industries of Maryland.** Md. State Board For. Baltimore. 122 p., illus.

Burns, Findley.
1948. **Maryland Forests and Forestry.** Md. State Board Nat. Resour. Ed. Ser. 17. Solomons Island, Md. 56 p., illus.

Ferguson, Roland H.
1967. **The Timber Resources of Maryland.** USDA Forest Serv. Resour. Bull. NE-7. 93 p., illus.

Maryland Department of Forests and Parks.
1965. **Maryland's Primary Wood Industry.** Md. Dep. For. Parks U&M Publ. No. 1, Annapolis. 38 p.

Ostrander Myron D.
1953. **Production and Marketing of Wood Piling and Poles in the Northeast.** USDA Forest Serv. Sta. Pap. 57. Northeast. For. Exp. Stn., Upper Darby, Pa. 23 p., illus.

Phelps, Robert B. and Thomas G. Gill.
1969. **Origin of Poles and Piling Handled by Wood-Treating Plants in the United States.** USDA Forest Serv. Res. Note WO-9. 12 p.

Simmons, Fred C. and Adna R. Bond.
1955. **Sawmill Waste in Maryland.** USDA Forest Serv. Stn. Pap. 74. Northeast. For. Exp. Stn., Upper Darby, Pa. 31 p., illus.

Smith, Harold D. and James O. Burnett.
1968. **Market Structure of the Sawmill Industry in the Handling of Forest Products in Maryland.** Univ. Md. Agric. Exp. Stn. Misc. Publ. 645. College Park. 19 p., illus.

Steer, Henry B.
1948. **Lumber Production in the United States 1799-1946.** U.S. Dep. Agric. Misc. Publ. 669. 233 p.

INDEX OF TABLES

INDUSTRIAL ROUNDWOOD

1. Volume of industrial roundwood in Maryland, by products harvested, 1975.
2. Timber products output from roundwood in Maryland, by products, 1952, 1963, and 1975.
3. Industrial timber harvest in Maryland, by geographic units, species groups, and products, 1975.

SAWLOG STATISTICS

4. Number of sawmills in Maryland, by geographic units and annual production classes, 1965 and 1975.
5. Number of sawmills and volume processed in Maryland, for selected years by geographic units.
6. Sawlog production for Maryland, by geographic units, species groups, and where received, 1975.
7. Sawlog receipts for Maryland, by geographic units, species groups, and where produced, 1975.
8. Sawlog production and receipts in the NORTH CENTRAL UNIT of Maryland, by species and destination of shipments, 1975.
9. Sawlog production and receipts in the WESTERN UNIT of Maryland, by species and destination of shipments, 1975.
10. Sawlog production and receipts in the SOUTHERN UNIT of Maryland, by species and destination of shipments, 1975.
11. Sawlog production and receipts in the SOUTHERN EASTERN SHORE UNIT of Maryland, by species and destination of shipments, 1975.
12. Sawlog production for Maryland, by counties and species groups, and where received, 1975.
13. Sawlog receipts for Maryland, by counties and species groups, and where produced, 1975.
14. Sawlog production and receipts in Maryland, by species and destination of shipments, 1975.

OTHER PRODUCT STATISTICS

15. Pulpwood production in Maryland, by species groups, 1961-1975.
16. Output of pulpwood from roundwood in Maryland, by species groups and geographic units, 1966-1975.
17. Veneer log and bolt production in Maryland, by species and state or province where consumed, 1975.
18. Veneer log production in Maryland for selected years.
19. Production and distribution of manufacturing residues in Maryland, by types of residues, type of uses, and source industries, 1975.
20. Volume of unused sawmill residues in Maryland, by geographic units, species groups, and types of residue, 1975.

Table 1.— *Volume of industrial roundwood in Maryland, by products harvested, 1975*

Product	Standard unit	Volume in standard units			Roundwood volume		
		All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
					Thousand cubic feet		
Sawlogs	M bd ft [a]	152,639	31,268	121,371	23,576	5,251	18,325
Veneer logs	M bd ft [a]	21,790	16,487	5,303	3,t71	2,770	801
Pulpwood	Std. cords	165,187	103,984	61,203	14,041	8,839	5,202
Cooperage logs	M bd ft [a]	1,530	158	1,372	234	27	207
Piling	M linear ft	2,855	2,615	240	1,193	1,049	144
Misc. products [b]	M ft³	171	97	74	171	97	74
Total					42,786	18,033	24,753

[a] International 1/4-inch rule.
[b] Includes poles, posts, and mine timbers.

Table 2.—*Timber products output from roundwood in Maryland, by products, 1952, 1963, and 197*

Product	All species				Softwoods				Hardwoods			
	1952	1963	1975	Change (63-75)	1952	1963	1975	Change (63-75)	1952	1963	1975	Change (3-75)
	Million cubic feet			*Percent*	*Million cubic feet*			*Percent*	*Million cubic feet*			*Percent*
Sawlogs	37.7	36.9	23.6	36	22.3	13.5	5.3	-61	15.4	23.4	18.3	-22
Veneer logs	1.6	2.5	3.6	+42	[a]	.2	2.8	[b]	1.6	2.3	.8	-65
Pulpwood	7.3	11.0	14.0	+27	6.0	5.8	8.8	+52	1.3	5.2	5.2	[a]
Cooperage logs	.4	1.4	.2	-84	--	.1	a	-57	.4	1.3	.2	-85
Piling	2.0	4.5	1.2	-73	1.6	3.6	1.0	-71	.4	.9	.2	-78
Misc. products [c]	3.7	.8	.2	-76	.4	.1	.1	[a]	3.3	.7	.1	-88
Total	52.7	57.1	42.8	-25	30.3	23.3	18.0	-22	22.4	33.8	24.8	-27

[a] Less than 50,000 cubic feet or 0.5 percent.
[b] 100 percent or more.
[c] Includes poles, posts, mine timber, hewn ties, excelsior bolts, shingle bolts, and chemical wood.

Table 3.—*Industrial timber harvest*[a] *in Maryland, by geographic units, species groups, and products, 1975*

(In thousands of cubic feet)

Geographic unit and species group	Product			All products
	Sawlogs	Pulpwood	Other products[b]	
North Central:				
Softwoods	505	739	80	1,324
Hardwoods	8,369	391	1,019	9,779
Total	8,874	1,130	1,099	11,103
Western:				
Softwoods	67	527	--	594
Hardwoods	2,749	4,607	63	7,419
Total	2,816	5,134	63	8,013
Southern:				
Softwoods	387	1,607	--	1,994
Hardwoods	5,046	25	--	5,071
Total	5,433	1,632	--	7,065
Southern Eastern Shore:				
Softwoods	4,292	5,966	3,863	14,121
Hardwoods	2,161	179	144	2,484
Total	6,453	6,145	4,007	16,605
All units:				
Softwoods	5,251	8,839	3,943	18,033
Hardwoods	18,325	5,202	1,226	24,753
Total	23,576	14,041	5,169	42,786

[a] Does not include fuelwood or removals that were not manufactured into industrial products.

[b] Other products include cooperage and veneer logs, mine timbers, handle stock, posts, poles, and piling.

Table 4.—*Number of sawmills in Maryland, by geographic units and annual production classes, 1965 and 1975*

Geographic unit	Production class[a]					
	Greater than 1 million board feet		Less than 1 million board feet		Total	
	1965	1975	1965	1975	1965	1975
North Central	31	16	22	32	53	48
Southern	8	10	14	6	22	16
Southern Eastern Shore	10	9	8	2	18	11
Western	8	3	7	13	15	16
All units	57	38	51	53	108	91

[a] Based upon the volume of lumber produced during calendar years 1965 and 1975.

Table 5.—*Number of sawmills and volume processed in Maryland, for selected years by geographic units*

Unit	Number of sawmills			Total volume processed			Volume processed per mill		
	1952	1965	1975	1952	1965	1975	1952	1965	1975
				Million board feet					
North Central	233	53	48	63.5	59.6	55.1	0.3	1.1	1.1
Western	79	22	16	20.9	25.0	15.5	.3	1.1	1.0
Southern	75	18	11	55.8	46.0	35.9	.7	2.5	3.3
Southern Eastern Shore	108	15	16	98.1	69.3	49.7	.9	4.6	3.1
Total	495	108	91	238.3	199.9	156.2	0.5	1.8	1.7

Table 6.—*Sawlog production for Maryland, by geographic units, species groups, and where received, 1975*

(In millions of board feet, *International 1/4-inch rule)*

Species group and geographic unit	Where received			Total production
	Within region	Within state	From other states	
Softwoods:				
North Central	0.5	2.5	[a]	3.0
Western	.4	[a]	[a]	.4
Southern	1.5	.8	--	2.3
Southern Eastern Shore	16.0	9.5	--	25.5
All softwoods	18.4	12.8	[a]	31.2
Hardwoods:				
North Central	23.9	27.6	3.9	55.4
Western	11.7	.6	5.9	18.2
Southern	17.4	14.8	1.2	33.4
Southern Eastern Shore	12.4	1.9	--	14.3
All hardwoods	65.4	44.9	11.0	121.3
All species	83.8	57.7	11.0	152.5

[a] Less than 50,000 board feet.

Table 7.—*Sawlog receipts for Maryland, by geographic unit, species groups, and where produced, 1975*

(In millions of board feet, *International 1/4-inch rule*)

Species group and geographic unit	Where produced			Total receipts
	Within region	Within state	In other states	
Softwoods:				
North Central	0.5	0.4	0.1	1.0
Western	.4	a	a	.4
Southern	1.5	1.2	--	2.7
Southern Eastern Shore	16.0	11.2	4.7	31.9
All softwoods	18.4	12.8	4.8	36.0
Hardwoods:				
North Central	23.9	24.7	5.5	54.1
Western	11.7	.7	2.7	15.1
Southern	17.4	15.4	.4	33.2
Southern Eastern Shore	12.4	4.1	1.3	17.8
All hardwoods	65.4	44.9	9.9	120.2
All species	83.8	57.7	14.7	156.2

[a] Less than 50,000 board feet.

Table 8.—*Sawlog production and receipts in the NORTH CENTRAL UNIT of Maryland, by species and destination of shipments, 1975*

(In millions of board feet, *International 1/4-inch rule*)

Species	Cut and retained in unit	Out-shipments		Total production	In-shipments		Total receipts
		To other units	To other states		From other units	From other states	
Loblolly pine	0.1	1.7	--	1.8	--	0.1	0.2
Virginia pine	.4	.7	a	1.1	0.4	--	.8
White pine	a	a	--	a	--	--	a
Other softwoods	a	.1	--	.1	--	--	a
Total softwoods	0.5	2.5	a	3.0	0.4	0.1	1.0
Ash	0.2	0.4	a	0.6	0.3	0.1	0.6
Black cherry	a	.1	--	.1	a	--	a
Gum	1.1	2.0	0.1	3.2	1.7	.2	3.0
Hard maple	.1	.1	a	.2	.1	--	.2
Soft maple	1.2	1.4	.1	2.7	1.5	.1	2.8
Red oaks	8.3	8.5	1.6	18.4	7.8	1.4	17.5
White oaks	4.4	4.2	.5	9.1	4.2	2.5	11.1
Yellow-poplar	6.4	7.9	1.2	15.5	6.8	.9	14.1
Black walnut	.1	a	a	.1	a	a	.1
Other hardwoods	2.1	3.0	.4	5.5	2.3	.3	4.7
Total hardwoods	23.9	27.6	3.9	55.4	24.7	5.5	54.1
All species	24.4	30.1	3.9	58.4	25.1	5.6	55.1

[a] Less than 50,000 board feet.

Table 9.—*Sawlog production and receipts in the WESTERN UNIT of Maryland, by species and destination of shipments, 1975*

(In millions of board feet, *International 1/4-inch rule)*

Species	Cut and retained in unit	Out-shipments		Total production	In-shipments		Total receipts
		To other units	To other states		From other units	From other states	
Hemlock	0.2	--	--	0.2	--	a	0.2
White pine	.2	a	a	.2	a	a	.2
Other softwoods	--	--	--	--	--	--	--
Total softwoods	0.4	a	a	0.4	a	a	0.4
Ash	0.4	a	0.3	0.7	a	0.1	0.5
Black cherry	.7	0.1	.3	1.1	0.1	.3	1.1
Hard maple	1.1	.1	.2	1.4	.1	.2	1.4
Soft maple	.9	a	.2	1.1	a	.3	1.2
Red oaks	5.2	.3	2.9	8.4	.3	.9	6.4
White oaks	2.6	.1	.7	3.4	.1	.3	3.0
Yellow-poplar	.4	a	.9	1.3	a	.4	.8
Black walnut	a	a	--	a	a	--	a
Other hardwoods	.4	a	.4	.8	.1	.2	.7
Total hardwoods	11.7	0.6	5.9	18.2	0.7	2.7	15.1
All species	12.1	0.6	5.9	18.6	0.7	2.7	15.5

[a] Less than 50,000 board feet.

Table 10.—*Sawlog production and receipts in the SOUTHERN UNIT of Maryland, by species and destination of shipments, 1975*

(In millions of board feet, *International 1/4-inch rule)*

Species	Cut and retained in unit	Out-shipments		Total production	In-shipments		Total receipts
		To other units	To other states		From other units	From other states	
Loblolly pine	0.2	0.1	--	0.3	0.1	--	0.3
Virginia pine	1.3	.6	--	1.9	.9	--	2.2
Other softwoods	--	.1	--	.1	.2	--	.2
Total softwoods	1.5	0.8	--	2.3	1.2	--	2.7
Ash	0.3	0.2	--	0.5	0.3	0.1	0.7
Black cherry	a	--	--	a	a	--	a
Gum	1.5	1.5	0.1	3.1	1.5	--	3.0
Hard maple	.3	.1	--	.4	.1	--	.4
Soft maple	.2	.6	.1	.9	.4	.1	.7
Red oaks	4.3	3.5	.4	8.2	3.5	.1	7.9
White oaks	2.6	2.7	.2	5.5	2.3	a	4.9
Yellow-poplar	5.1	4.3	.2	9.6	5.0	.1	10.2
Black walnut	.1	.1	--	.2	.1	a	.2
Other hardwoods	3.0	1.8	.2	5.0	2.2	--	5.2
Total hardwoods	17.4	14.8	1.2	33.4	15.4	0.4	33.2
All species	18.9	15.6	1.2	35.7	16.6	0.4	35.9

[a] Less than 50,000 board feet.

Table 11.—*Sawlog production and receipts in the SOUTHERN EASTERN SHORE UNIT of Maryland, by species and destination of shipments, 1975*

(In millions of board feet, *International 1/4-inch rule*)

Species	Cut and retained in unit	Out-shipments		Total production	In-shipments		Total receipts
		To other units	To other states		From other units	From other states	
Loblolly pine	15.6	9.2	--	24.8	10.8	4.4	30.8
Virginia pine	.4	.2	--	.6	.3	.3	1.0
Other softwoods	a	.1	--	.1	.1	--	.1
Total softwoods	16.0	9.5	--	25.5	11.2	4.7	31.9
Gum	2.5	0.2	--	2.7	0.5	0.4	3.4
Hard maple	a	.1	--	.1	.1	--	.1
Soft maple	1.2	.1	--	1.3	.3	.1	1.6
Red oaks	3.2	.3	--	3.5	.9	.3	4.4
White oaks	2.8	.3	--	3.1	.8	.1	3.7
Yellow-poplar	1.5	.2	--	1.7	.5	.2	2.2
Other hardwoods	1.2	.7	--	1.9	1.0	.2	2.4
Total hardwoods	12.4	1.9	--	14.3	4.1	1.3	17.8
All species	28.4	11.4	--	39.8	15.3	6.0	49.7

[a] Less than 50,000 board feet.

Table 12.—*Sawlog production for Maryland, by counties and species groups, and where received, 1975*

(In millions of board feet, *International 1/4-inch rule*)

County	Softwoods				Hardwoods				
	Where received			Total softwoods	Where received			Total hardwoods	Total production
	Within county	Within state	In other states		Within county	Within state	In other states		
Allegany	0.1	--	--	0.1	5.6	a	3.3	8.9	9.0
Anne Arundel	.1	0.1	--	.2	2.7	2.4	--	5.1	5.3
Baltimore	--	--	--	--	1.3	3.1	1.2	5.6	5.6
Calvert	.6	a	--	.6	4.4	.7	--	5.1	5.7
Caroline	a	.8	--	.8	.9	.6	--	1.5	2.3
Carroll	--	a	--	a	2.5	.6	.1	3.2	3.2
Cecil	--	--	--	--	.5	3.0	.3	3.8	3.8
Charles	.7	.3	--	1.0	11.6	6.5	--	18.1	19.1
Dorchester	3.8	1.2	--	5.0	8.7	--	--	8.7	13.7
Frederick	a	--	--	a	1.3	.4	.5	2.2	2.2
Garrett	.3	a	a	.3	6.1	.6	2.6	9.3	9.6
Harford	--	-	--	--	3.8	2.4	.9	7.1	7.1
Howard	--	--	--	--	.2	1.6	--	1.8	1.8
Kent	--	.1	--	.1	--	.6	--	.6	.7
Montgomery	a	--	--	a	2.3	.2	--	2.5	2.5
Prince Georges	--	.4	--	.4	.1	5.7	--	5.8	6.2
Queen Annes	.1	.2	--	.3	3.9	4.1	--	8.0	8.3
Somerset	--	3.0	--	3.0	--	.3	--	.3	3.3
St. Marys	.2	.5	--	.7	1.4	7.6	1.2	10.2	10.9
Talbot	.3	.9	--	1.2	3.9	2.6	--	6.5	7.7
Washington	a	--	a	a	.5	.3	.9	1.7	1.7
Wicomico	4.4	1.6	--	6.0	1.4	.2	--	1.6	7.6
Worcester	7.8	3.7	--	11.5	2.3	1.4	--	3.7	15.2
Total	18.4	12.8	a	31.2	65.4	44.9	11.0	121.3	152.5

[a] Less than 50,000 board feet.

Table 13.—*Sawlog receipts for Maryland, by counties and species groups, and where produced, 1975*

(In millions of board feet, *International 1/4-inch rule*)

County	Softwoods				Hardwoods				
	Where produced			Total softwoods	Where produced			Total hardwoods	Total receipts
	Within county	Within state	In other states		Within county	Within state	In other states		
Allegany	0.1	a	a	0.1	5.6	0.7	0.9	7.2	7.3
Anne Arundel	.1	0.1	--	.2	2.7	6.1	--	8.8	9.0
Baltimore	--	--	--	--	1.3	1.4	--	2.7	2.7
Calvert	.6	.6	--	1.2	4.4	6.5	--	10.9	12.1
Caroline	a	--	a	a	.9	1.8	.4	3.1	3.1
Carroll	--	--	--	--	2.5	2.9	2.3	7.7	7.7
Cecil	--	a	--	a	.5	2.4	.5	3.4	3.4
Charles	.7	.6	--	1.3	11.6	7.7	--	19.3	20.6
Dorchester	3.8	1.8	0.1	5.7	8.7	2.3	.6	11.6	17.3
Frederick	a	a	--	a	1.3	1.5	.1	2.9	2.9
Garrett	.3	--	a	.3	6.1	--	1.8	7.9	8.2
Harford	--	--	--	--	3.8	5.2	1.0	10.0	10.0
Howard	D	--	--	D	D	--	--	D	D
Kent	--	--	--	--	--	--	--	--	--
Montgomery	a	--	--	a	2.3	--	--	2.3	2.3
Prince Georges	D	--	--	D	D	--	--	D	D
Queen Annes	.1	.1	.1	.3	3.9	.3	1.2	5.4	5.7
Somerset	D	--	--	D	D	--	--	D	D
St. Marys	.2	--	--	.2	1.4	1.2	.4	3.0	3.2
Talbot	D	D	--	D	D	D	--	D	D
Washington	a	--	--	a	.5	--	--	.5	.5
Wicomico	4.4	8.1	3.7	16.2	1.4	1.4	.3	3.1	19.3
Worcester	7.8	1.3	.9	10.0	2.3	.4	.4	3.1	13.1
Total	18.4	12.8	4.8	36.0	65.4	44.9	9.9	120.2	156.2

[a] Less than 50,000 board feet.

D: Data withheld to avoid disclosure for individual mills.

Table 14.—*Sawlog production and receipts in Maryland, by species and destination of shipments, 1975*

(In millions of board feet, *International 1/4-inch rule*)

Species	Cut and retained in state	Exported to			Total production	Imported from			Total receipts
		Pennsylvania	West Virginia	Other states		Delaware	Pennsylvania	Other states	
Hemlock	0.2	--	--	--	0.2	--	--	a	0.2
Loblolly pine	26.9	--	--	--	26.9	4.4	--	a	31.3
Virginia pine	3.6	--	a	--	3.6	.3	--	0.1	4.0
White pine	.2	--	a	--	.2	--	a	--	.2
Other softwoods	.3	--	--	--	.3	--	--	--	.3
Total softwoods	31.2	--	a	--	31.2	4.7	a	0.1	36.0
Ash	1.5	0.1	0.2	--	1.8	0.1	0.1	0.1	1.8
Black cherry	.9	--	.3	--	1.2	--	a	.2	1.1
Gum	8.9	a	--	0.1	9.0	.5	a	a	9.4
Hard maple	1.8	--	.3	--	2.1	--	.1	.2	2.1
Soft maple	5.6	--	.2	.2	6.0	.2	.2	.3	6.3
Red oak	33.5	3.0	1.4	.6	38.5	1.1	.8	.8	36.2
White oak	19.7	.3	.8	.3	21.1	.6	.8	1.6	22.7
Yellow-poplar	25.8	1.3	.8	.2	28.1	.5	.5	.5	27.3
Other hardwoods	12.6	.3	.4	.2	13.5	.3	.3	.1	13.3
Total hardwoods	110.3	5.0	4.4	1.6	121.3	3.3	2.8	3.8	120.2
All species	141.5	5.0	4.4	1.6	152.5	8.0	2.8	3.9	156.2

[a] Less than 50,000 board feet.

Table 15.—*Pulpwood production in Maryland, by species groups, 1961-1975*[a]

(In thousands of standard cords)

Year	All species	Softwoods	Hardwoods
1961	137.6	88.2	49.4
1962	142.0	91.0	51.0
1963	183.5	108.1	75.4
1964	189.8	98.9	90.9
1965	205.2	104.0	101.2
5-year total	858.1	490.2	367.9
1966	200.0	87.6	112.4
1967	250.9	133.3	117.6
1968	315.9	195.3	120.6
1969	358.6	229.5	129.1
1970	312.8	190.1	122.7
5-year total	1,438.2	835.8	602.4
1971	278.8	158.0	120.8
1972	268.7	152.1	116.6
1973	277.1	155.4	121.7
1974	285.4	155.5	129.9
1975	266.1	159.8	106.3
5-year total	1,376.1	780.8	595.3

[a] Includes production from both roundwood and chips from manufacturing residues.

Table 16.—*Output of pulpwood from roundwood in Maryland, by species groups and geographic units, 1966-75*

(In thousands of standard cords)

Species group and geographic unit	Roundwood pulpwood output in--										All years
	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	
Softwoods:											
North Central	12.6	9.2	11.0	11.3	11.9	13.1	10.6	10.5	12.3	8.7	111.2
Western	6.4	7.9	5.0	6.1	3.1	4.1	5.2	4.1	3.9	6.2	52.0
Southern	3.8	6.0	11.3	11.1	9.7	10.4	10.7	14.1	19.3	18.9	115.3
Southern Eastern Shore	41.3	75.0	102.0	103.1	95.6	51.6	56.5	76.9	68.5	70.2	740.7
All softwoods	64.1	98.1	129.3	131.6	120.3	79.2	83.0	105.6	104.0	104.0	1,019.2
Hardwoods:											
North Central	4.4	6.9	4.5	10.5	12.5	4.7	2.9	4.6	11.7	4.6	67.3
Western	83.6	84.5	82.4	70.7	61.4	70.6	65.6	63.4	59.2	54.2	695.6
Southern	.1	.2	.4	.7	.3	[a]	1.9	1.1	1.0	.3	6.0
Southern Eastern Shore	.9	2.6	.7	.9	1.7	.1	.4	.9	1.6	2.1	11.9
All hardwoods	89.0	94.2	88.0	82.8	75.9	75.4	70.8	70.0	73.5	61.2	780.8
All species	153.1	192.3	217.3	214.4	196.2	154.6	153.8	175.6	177.5	165.2	1,800.0

[a] Less than 50 cords.

Table 17.—*Veneer log and bolt production in Maryland, by species and state or province where consumed, 1975*[a]

(In thousands of board feet, *International 1/4-inch rule*)

Species	State or province where consumed					Total production
	Maryland	North Carolina	Pennsylvania	West Virginia	Ontario	
Red oaks	289	--	405	81	42	817
White oaks	255	--	--	--	46	301
Yellow pine	16,487	--	--	--	--	16,487
Yellow-poplar	157	3,989	--	--	--	4,146
Black walnut	--	--	--	--	39	39
All species	17,188	3,989	405	81	127	21,790

[a] Veneer logs that were handled by brokers for overseas shipment are not included.

Table 18.—*Veneer-log production in Maryland for selected years*[a]

(In thousands of board feet, *international 1/4-inch rule*)

Year	Softwood	Hardwood	All species
1952	12	1,789	1,801
1962	16	8,189	8,205
1963	1,035	14,891	15,926
1968	8,069	24,348	32,417
1972	18,312	8,368	26,680
1975	16,487	5,303	21,790

[a] Veneer logs that were handled by brokers for overseas shipment are not included.

Table 19.—*Production and disposition of manufacturing residues in Maryland, by types of residues, types of uses, and source industries, 1975*

(In thousands of cubic feet)

Source industry	Type of use	Type of residue			All types
		Bark	Coarse [a]	Fine [b]	
Lumber	Fiber	--	5,567	--	5,567
	Fuel [c]	89	891	22	1,002
	Agriculture [d]	3,040	--	4,485	7,525
	Other [e]	283	428	388	1,099
	All uses	3,412	6,886	4,895	15,193
	Unused	447	172	274	893
Veneer	Fiber	--	961	--	961
	Fuel	802	18	827	1,647
	Agriculture	70	120	50	240
	Other	--	--	--	--
	All uses	872	1,099	877	2,848
	Unused	--	--	--	--
Other industries [f]	Fiber	--	208	--	208
	Fuel	--	44	36	80
	Agriculture	1,727	--	161	1,888
	Other	4,547	--	--	4,547
	All uses	6,274	252	197	6,723
	Unused	5	3	4	12
All industries	Fiber [g]	--	6,736	--	6,736
	Fuel	891	953	885	2,729
	Agriculture	4,837	120	4,696	9,653
	Other	4,830	428	388	5,646
	All uses	10,588	8,237	5,969	24,764
	Unused	452	175	278	905

[a] Coarse residues include slabs, edgings, trimmings, veneer cores, and other material suitable for chipping.

[b] Fine residues include sawdust, shavings, and other material considered unsuitable for chipping.

[c] Includes both domestic and industrial fuel.

[d] Includes livestock bedding, chicken litter, and farm and horticulutral mulch.

[e] Includes specialty items and charcoal wood.

[f] Includes bark only from the woodpulp industry and industries such as cooperage and piling.

[g] Pulpmills reported receiving 8.6 million cubic feet of chipped manufacturing residues during 1975.

Table 20.—*Volume of unused sawmill residues in Maryland, by geographic regions, species groups, and types oif residue, 1975*

(In thousands of cubic feet)

Geographic unit	Softwood			Hardwood			All species		
	Bark	Coarse	Fine	Bark	Coarse	Fine	Bark	Coarse	Fine
North Central	12	1	2	329	34	92	341	35	94
Western	2	--	1	30	4	42	32	4	43
Southern	7	10	7	43	82	130	50	92	137
Southern Eastern Shore	10	13	--	14	28	--	24	41	--
All units	31	24	10	416	148	264	447	172	274

Headquarters of the Northeastern Forest Experiment Station are in Upper Darby, Pa. Field laboratories and research units are maintained at:

- Amherst, Massachusetts, in cooperation with the University of Massachusetts.
- Beltsville, Maryland.
- Berea, Kentucky, in cooperation with Berea College.
- Burlington, Vermont, in cooperation with the University of Vermont.
- Delaware, Ohio.
- Durham, New Hampshire, in cooperation with the University of New Hampshire.
- Hamden, Connecticut, in cooperation with Yale University.
- Kingston, Pennsylvania.
- Morgantown, West Virginia, in cooperation with West Virginia University, Morgantown.
- Orono, Maine, in cooperation with the University of Maine, Orono.
- Parsons, West Virginia.
- Pennington, New Jersey.
- Princeton, West Virginia.
- Syracuse, New York, in cooperation with the State University of New York College of Environmental Sciences and Forestry at Syracuse University, Syracuse.
- Warren, Pennsylvania.

Bones, James T., and John E. Brodie.
1977. **The timber industries of Maryland.** Northeast. For. Exp. Stn., Upper Darby, Pa.
20 p., illus. (USDA For. Serv. Resour. Bull. NE-52)

The result of a complete survey of the timber industries of Maryland, this report contains statistics about industrial timber production and receipts, and production and disposition of the manufacturing residues. Comparisons are made with the most recent previous survey, and trends in industrial wood output are noted.

Keywords: timber output, wood residue disposal, Maryland manufacturers, production statistics.

792:83 (752)

Bones, James T., and John E. Brodie.
1977. **The timber industries of Maryland.** Northeast. For. Exp. Stn., Upper Darby, Pa.
20 p., illus. (USDA For. Serv. Resour. Bull. NE-52)

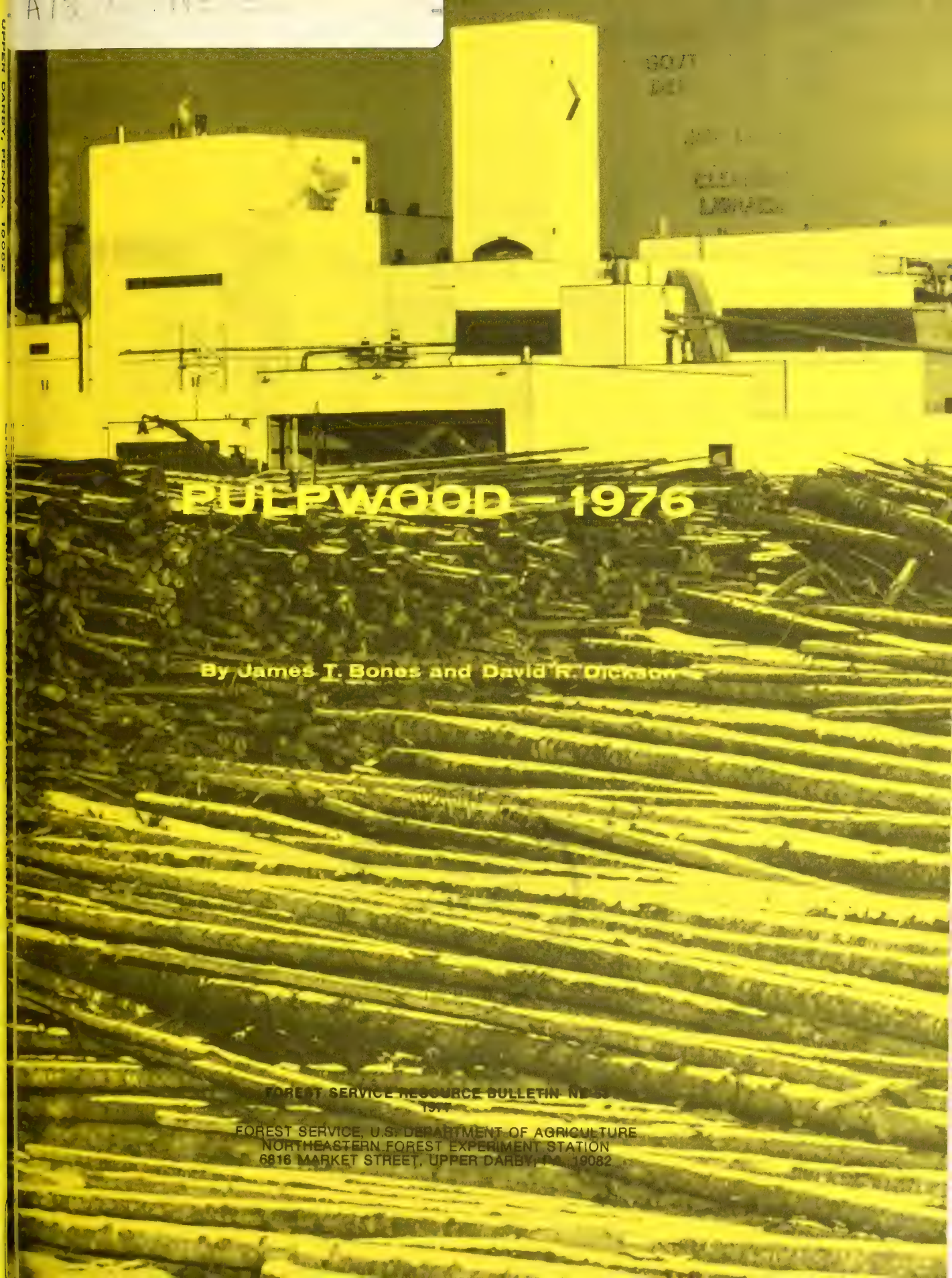
The result of a complete survey of the timber industries of Maryland, this report contains statistics about industrial timber production and receipts, and production and disposition of the manufacturing residues. Comparisons are made with the most recent previous survey, and trends in industrial wood output are noted.

Keywords: timber output, wood residue disposal, Maryland manufacturers, production statistics.

792:83 (752)

FOREST SERVICE
AGRICULTURE
UPPER DARBY, PENNA. 19082

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300



PULPWOOD — 1976

By James T. Bones and David R. Dickson

FOREST SERVICE RESOURCE BULLETIN NE-37
1977

FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE
NORTHEASTERN FOREST EXPERIMENT STATION
6816 MARKET STREET, UPPER DARBY, PA. 19082

The Authors

JAMES T. BONES, research forester, received his bachelor's degree in soil conservation from Utah State University in 1952 and his master's degree in forest management from the same university in 1956. He worked at the Pacific Northwest Station and the Institute of Northern Forestry until 1965, when he became a United Nations forestry advisor to the Government of Colombia in South America. After his return in March 1968, he was transferred to the Northeastern Forest Experiment Station. He is now stationed in Upper Darby, Pa., where he is working in the timber-removals phase of Forest Resources Evaluation.

DAVID R. DICKSON, research forester, received his bachelor's degree in forestry from the University of New Hampshire in 1954. He joined the Lake States Forest Experiment Station in 1954. After serving 2 years in the Army, he joined the Northeastern Forest Experiment Station in 1957. Since that time he has been involved in the many aspects of the field-office phases of the Forest Survey. He is now responsible for operation of the data-processing system to compile, summarize, and analyze resource data from the many and varied resource studies of the Resources Evaluation work unit.

MANUSCRIPT RECEIVED FOR PUBLICATION 21 JULY 1977

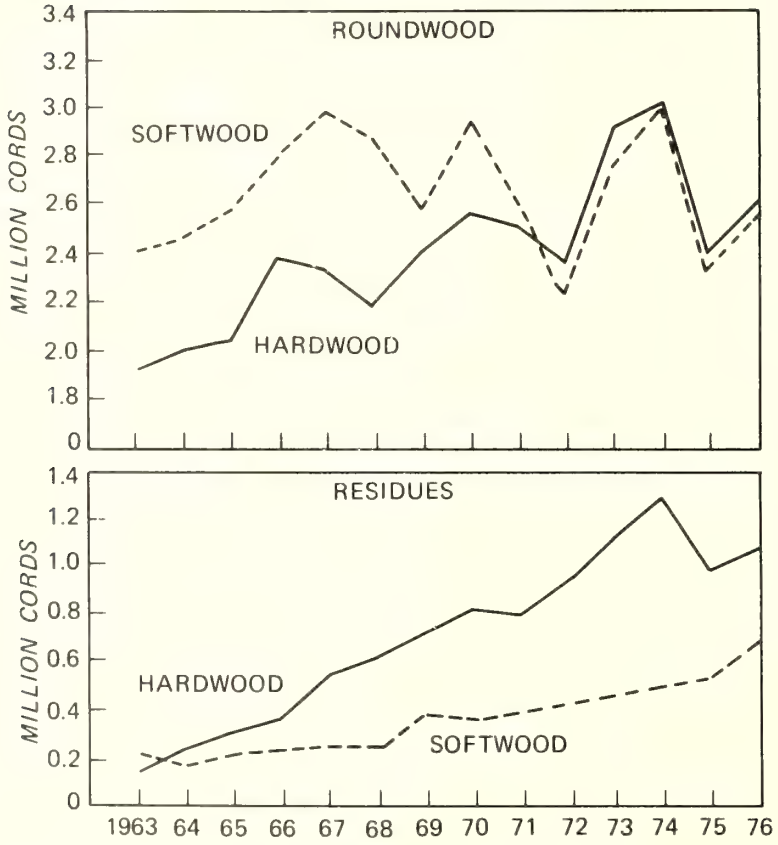
COVER PHOTO. In order to comply with new environmental standards, Scott Paper Company in Maine was faced with several alternatives; modernizing their old 450 ton-per-day sulfite mill at Winslow, replacing it with a new mill, or purchasing wood pulp on the open market to satisfy their growing requirements. Since the company owns 880,000 acres of timberlands in Maine that have yet to be fully utilized, Scott elected to replace the old mill with a modern one that could better utilize the forest resource and produce an additional volume of pulp to support future growth. The new 800 ton-per-day Kraft mill at Somerset (pictured on the cover) became operational this fall when the Winslow mill was closed. *(Cover photo credit:* Scott Paper Company).

PULPWOOD — 1976

CONTENTS

BACKGROUND 1
PULPWOOD PRODUCTION CONTINUES RECOVERY 1
PRODUCTION FROM ROUNDWOOD UP 12 PERCENT 2
TWENTY COUNTIES TOP 50-THOUSAND-CORD MARK 2
TOTAL TREE HARVESTING 2
ROUNDWOOD HARVEST AS RELATED TO GROWING-STOCK INVENTORY 3
WOOD CHIP PRODUCTION INCREASES 21 PERCENT 4
TABULAR DATA 10

Figure 1.—Pulpwood production for Northeastern States, by years and sources of wood.



Background

THIS ANNUAL REPORT is based on a canvass of all pulpmills in the Northeast that use wood—either roundwood or plant residues—as a basic raw material. Cross-boundary shipments are traced by exchanging information with neighboring experiment stations that conduct similar canvasses. Mills that use pulpwood as a raw material in producing insulation board and hardboard were included in the canvass.

The statistics for production from roundwood reported in this bulletin are based upon mill receipts, which are subject to fluctuations caused by uneven wood-inventory buildups or liquidations from year to year. The plant residues are received at the pulpmill mostly in chip form. Origins of mill receipts of pulpwood from roundwood are reported by county where harvested. However, pulpwood from plant residue can be traced only to the state where it was produced. Some of the logs from which the residue came were probably harvested in states other than the one in which they were processed.

Pulpwood production continues recovery

The 6,946,900 cords[1] of pulpwood produced in the 14 northeastern states (Connecticut, Delaware, Kentucky, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, and West Virginia) in 1976 represented an increase of 14 percent over the 6,109,600 cords reported in 1975, but production was still 10 percent below the record high reached in 1974. Production of both softwood and hardwood roundwood and softwood and hardwood chips was higher in 1976 than in 1975 (Fig. 1). Softwood chip production from manufacturing residues outperformed the other components of total production, increasing 31 percent between 1975 and 1976. Chipped hardwood residues increased by 15 percent over the previous year and softwood and hardwood roundwood production increased 10 percent and 13 percent respectively.

Woodyard inventories continued to drop during the first half of 1976 as northeastern pulpmills operated at near-capacity rates. By June woodyards were at their lowest levels in 2 years and demand for replacement wood picked up. Although high pulpwood consumption in August almost offset receipts, inventories began to rise during the remainder of the year as consumption decreased.

Roundwood pulpwood production from hardwoods was almost equal to that from softwoods, exceeding it by only 73,800 cords. Although roundwood production increased 12 percent from 1975, chipped residue production increased 21 percent. Hardwoods accounted for 53 percent of all pulpwood produced in 1976, about the same percentage as in 1975.

Receipts of pulpwood at woodpulp mills in the Northeast totaled 7,487,700 cords in 1976, up 12 percent from 1975. These receipts included wood harvested in the Northeast and pulpwood imported from other regions. Hardwood receipts exceeded those of softwoods by 336,300 cords. Total receipts exceeded total production by 540,800 cords (Table 2).

Six of the 14 states (Connecticut, Delaware, Massachusetts, New Hampshire, Vermont, and West Virginia) produced more wood than they received. Delaware, Massachusetts, and West Virginia had no operating woodpulp mills, so all of their production was shipped to other states for manufacture. Vermont and Connecticut each had one operating pulpmill. Pulpwood production decreased between 1975 and 1976 in only four of the 14 northeastern states. Production declined by more than 10 percent in West Virginia and Rhode Island. Production increased by more than 25 percent in Delaware, New York, and Ohio. In New Hampshire, pulpmill receipts declined by more than 25 percent. Increases in pulpwood receipts of 25 percent or

[1]One standard cord = 85 ft^3 = 2.41 m^3.

more over 1975 levels were registered in Connecticut and Ohio.

In previous years, a major portion of the northeastern requirement for pulpwood was satisfied by shipments of Canadian softwood into the Northeast. This trend has been changing as more southern pulpwood has been finding its way into northern woodyards and as pulpmills used larger amounts of hardwood. In 1976, about 48 percent of the roundwood shipments into the Northeast came from Canada, and 44 percent came from the southern states. The remaining 8 percent came from the North Central States. Although softwood roundwood imports exceeded hardwood imports in 1976 by more than 2 to 1, the reverse was true for chipped manufacturing residue imports.

Production from roundwood up 12 percent

The production of pulpwood from roundwood increased by 535,100 cords—a 12 percent increase from 1975. The 5,173,800 cords of roundwood produced in 1976 represents a restoration of the incremental climb that was begun in 1972 and interrupted by the 1975 economic slowdown. A decade ago, roundwood production in the Northeast first exceeded 5 million cords and it has remained above that level for 7 of the last 10 years.

The 1976 pulpwood production from roundwood was up from 1975 in 9 of the 14 states. Massachusetts, New Hampshire, New Jersey, Rhode Island, and West Virginia all registered production declines. West Virginia's 22 percent production decline to 213,200 cords was the most severe year-to-year loss. New York and Ohio registered production gains of more than 25 percent. Maine, which accounts for 54 percent of the roundwood harvest in the Northeast, registered a 12 percent increase in production between 1975 and 1976.

Twenty counties top 50-thousand-cord mark

Twenty counties in six states produced more than 50,000 cords of pulpwood from roundwood in 1976. This is an increase of seven counties from the 1975 level, and it equals the previous high that was reached in 1974. The 3.3 million cords of roundwood harvested from these coun ties represents 64 percent of the tota roundwood harvest in the Northeast.

A significant increase in the harvest in Nev York was responsible for adding four counties t this year's list of high producers. A Penn sylvania county was also restored to the lis after not being represented last year. As i previous years, Maine counties dominated th high-producer list, accounting for 11 of the 2 counties listed. Counties that produced mor than 50,000 cords of pulpwood from roundwoo in 1976 and their production totals are:

County	*Production (thousand cords)*
Aroostook Co., Maine	567.1
Piscataquis Co., Maine	431.7
Somerset Co., Maine	358.8
Washington Co., Maine	353.1
Penobscot Co., Maine	288.7
Oxford Co., Maine	268.6
Franklin Co., Maine	147.5
Coos Co., New Hampshire	136.7
Essex Co., Vermont	93.4
Essex Co., New York	78.9
Kennebec Co., Maine	64.6
Greenbrier Co., W. Virginia	62.4
Hamilton Co., New York	59.8
Hancock Co., Maine	57.3
Warren Co., New York	55.0
St. Lawrence Co., New York	54.3
Lycoming Co., Pennsylvania	53.2
Saratoga Co., New York	52.8
Waldo Co., Maine	52.3
Cumberland Co., Maine	51.4

Total-tree harvesting

Total-tree harvesting—removal of the entir aboveground portion of the tree—continues t be the most important breakthrough i harvesting technology in the Northeast. Mos logging operators agree that fiber yields pe acre can be increased by 50 to 100 percent an that the system has the potential of doubling th daily productivity per worker in norma pulpwood logging operations.

But total acceptance of the system in th Northeast will continue to depend on pulpmil personnel. In the future, grit-free, uniform, un barked chips will be acceptable at most of th region's mills, so quality control is a key t acceptance. One indication of the growing accep tance of total-tree chips by northeastern pape and paperboard manufacturers is the growth in output that has been experienced in the past 2 years. The following tabulation compares total-

ree chip output by states in 1974 with that in 976:

	1974	1976	Change
	- (thousand cords) -		(percent)
Maine	99.4	179.3	+80
Maryland	0	8.3	(a)
New Hampshire	23.1	35.6	+54
New Jersey	.1	.6	(b)
New York	5.0	11.6	(b)
Ohio	74.4	147.6	+98
Pennsylvania	26.8	35.1	+31
Vermont	0	30.8	(a)
West Virginia	7.3	23.5	(b)

[a] No output in 1974.
[b] Greater than 100 percent change.

Overall, between 1974 and 1976, the total-tree hip harvest in the Northeast increased 87 per-ent. In Maine and Ohio, where the use of total ree chips for woodpulp was pioneered, produc-ion increased 80 percent and 98 percent, respec-ively. The 179,300 cords that were produced in Maine in 1976 accounted for only 6 percent of he total harvest, but the 147,600 cords produced n Ohio represented 55 percent of the total arvest.

Roundwood harvest as related to growing-stock inventory

Although Figures 3, 4, and 5 show the total oundwood harvest by production class and ounty in the Northeast, these figures do not elate the volume harvested to the volume of rowing-stock trees that are actually present. rowing-stock volume is net volume in cubic eet of sound live trees of commercial species hat are 5.0 inches d.b.h. or larger, from a 1-foot tump to a minimum 4.0-inch top diameter out-ide bark of the central bole, or to the point here the bole breaks into limbs.[2] The growing-tock volumes by species group and states that re used for making this comparison are based n those compiled for the 1970 National Timber eview.

The following tabulation of harvesting inten-ty shows the volume of growing stock present er unit harvested—by state and species group—in thousand cubic feet of growing stock present for each cord of pulpwood harvested in 1976:

Softwood	
Maryland	4.7
Delaware	6.0
Maine	7.8
Average	10.8
West Virginia	12.3
New York	15.1
Vermont	16.8
New Jersey	18.0
Ohio	19.7
Rhode Island	33.2
Kentucky	34.9
Pennsylvania	44.6
New Hampshire	51.6
Connecticut	53.0
Massachusetts	120.3
Hardwoods	
Maine	7.1
Ohio	15.6
New Hampshire	17.1
New York	25.8
Average	27.7
Vermont	29.7
Pennsylvania	31.7
Maryland	41.2
Delaware	80.8
West Virginia	84.1
Rhode Island	117.5
Kentucky	151.5
Connecticut	879.2
Massachusetts	927.1
New Jersey	1,221.5

The states have been ranked (top to bottom) from the state in which the roundwood harvest was most intensive to the state in which the harvest was least intensive. The average for the region is shown where it falls in the ranking. These rankings and the regional averages should not be viewed as an index or standard for harvesting, but simply as a means of directing individuals engaged in pulpwood procurement from several alternative areas toward the most promising one.

For each cord of pulpwood harvested in the Northeast in 1976, there were 10,800 cubic feet of softwood growing stock and 27,700 cubic feet of hardwood growing stock. The softwood harvest was more intensive than the regional average in Maryland, Delaware, and Maine. The hardwood harvest was more intensive than the regional average in Maine, Ohio, New

[2] 1 ft^3 = 0.028 m^3
5.0 in = 12.7 cm
4.0 in = 10.16 cm
1000 ft^3 = 28 m^3

Hampshire, and New York. Harvesting intensity was relatively low in the more urban states of the Northeast.

Wood chip production increases 21 percent

The production of wood chips and sawdust from plant residues for use as woodpulp increased 21 percent from the 1,470,900 cord equivalents produced in 1975. A pickup in primary wood manufacturing that started late in 1975 continued throughout 1976, increasing pulp-chip availability. In hardwood-producing regions of the Northeast, which registered a production decrease in 1975, a 15 percent gain was experienced in pulp chip production. Softwood manufacturers, buoyed by increased housing starts, had a 31 percent increase in pulp chip production between 1975 and 1976.

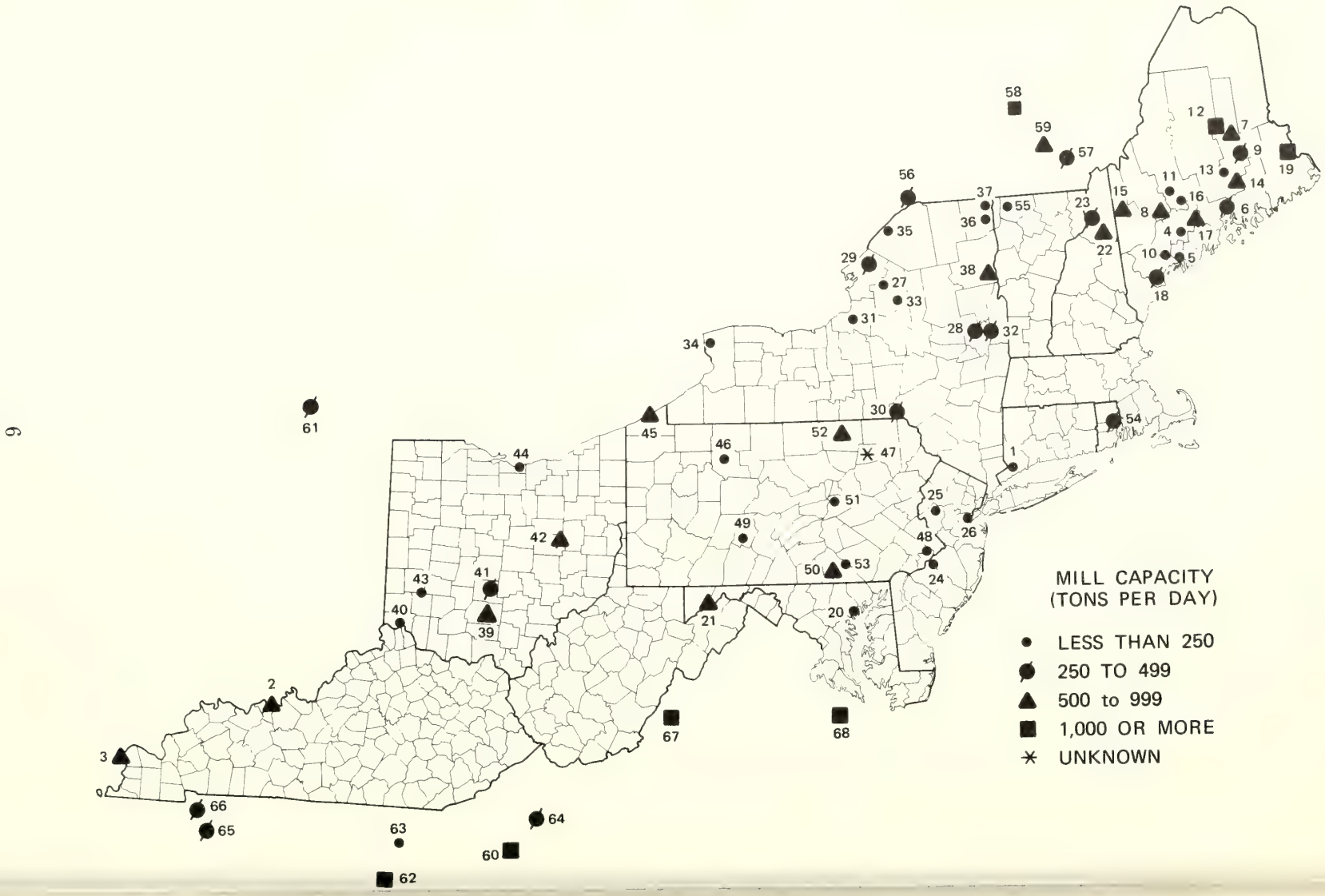
Pulpwood chip production by states in 1975 and 1976 are compared in the following tabulation:

	1975	*1976*	*Change*
	(thousand cord equivalents)		*(percent)*
Connecticut	2.2	2.4	+9
Delaware	—	12.6	b
Kentucky	193.3	238.0	+23
Maine	374.9	484.1	+29
Maryland	100.9	108.3	+7
Massachusetts	29.9	32.1	+7
New Hampshire	120.3	140.1	+16
New Jersey	7.6	7.5	-1
New York	124.1	156.5	+26
Ohio	93.4	112.7	+21
Pennsylvania	244.1	284.3	+16
Rhode Island	a	a	c
Vermont	44.5	44.6	c
West Virginia	135.7	149.9	+10
Total	1,470.9	1,773.1	+21

[a] Less than 50 cord equivalents.
[b] No production in 1975.
[c] Less than 0.5 percent change.

Chip production was up in 13 of the 14 states. New Jersey experienced a 1 percent decrease in chip production. The highest absolute volume gain and percentage gain was made by Maine; up 109,200 cords or 29 percent over 1975. The 1976 production of chips and sawdust from manufacturing residues accounted for 26 percent of the northeastern pulpwood production total, up 2 percentage points from 1975. Chip production for softwoods in 1976 stands at an all-time record level.

Figure 2.—Mills using northeastern pulpwood in 1976.



in tons per 24 hours, 1976

Location	Company name	Type of pulp produced (Capacity in tons/24 hrs.)					
		Total	Sulfate	Ground-wood	Semi-chemical	Sulfite	Miscellaneous [a]
		WITHIN THE NORTHEAST					
Connecticut:							
1. Stratford	Tilo Company	35	—	—	—	—	35
Total (1 mill)		35	—	—	—	—	35
Kentucky:							
2. Hawesville	Wescor and Western Kraft [a]	620	320	—	300	—	—
3. Wickliffe	Westvaco Corp.	600	600	—	—	—	—
Total (3 mills)		1,220	920	—	300	—	—
Maine:							
4. Augusta	Statler Tissue Co.	*	—	—	—	—	—
5. Brunswick	Pejepscot Paper Co.	110	—	110	—	—	—
6. Bucksport	St. Regis Paper Co. [b]	470	150	320	—	—	—
7. E. Millinocket	Great Northern-Nekoosa Corp.	920	—	920	—	—	—
8. Jay	International Paper Co. [b]	775	600	175	—	—	—
9. Lincoln	Premoid Corp.	360	360	—	—	—	—
10. Lisbon Falls	U.S. Gypsum	100	—	100	—	—	—
11. Madison	Penntech Paper Inc.	170	—	170	—	—	—
12. Millinocket	Great Northern-Nekoosa Corp. [b]	1,400	—	800	—	600	—
13. Old Town	Lily Tulip Corp.	50	—	50	—	—	—
14. Old Town	Diamond International Corp. [b]	760	760	—	—	—	—
15. Rumford	Boise Cascade Corp. [b]	695	585	110	—	—	—
16. Shawmut	Keyes Fibre Co.	105	—	105	—	—	—
17. Skowhegan	Scott Paper Co.	750	750	—	—	—	—
18. Westbrook	Scott Paper Co.	300	300	—	—	—	—
19. Woodland	Georgia Pacific Corp. [b]	1,040	800	240	—	—	—
Total (21 mills)		8,005	4,305	3,100	—	600	—
Maryland:							
20. Finksburg	Conogoleum Corp.	45	—	—	—	—	45
21. Luke	Westvaco	789	789	—	—	—	—
Total (2 mills)		834	789	—	—	—	45
New Hampshire:							
22. Berlin	Brown Company [b]	975	725	—	250	—	—
23. Groveton	Diamond International Corp.	250	—	—	250	—	—
Total (3 mills)		1,225	725	—	500	—	—
New Jersey:							
24. Gloucester City	GAF Corp.	192	—	—	—	—	192
25. Manville	Johns-Manville	100	—	—	—	—	100
26. Perth Amboy	Jim Walter Corp.	100	—	—	—	—	100
Total (3 mills)		392	—	—	—	—	392

CONTINUED

Location	Company name	Type of pulp produced (Capacity in tons/24 hrs.)					
		Total	Sulfate	Ground-wood	Semi-chemical	Sulfite	Miscellaneous [a]
New York:							
27. Beaver Falls	Latex Fiber Industries	70	—	70	—	—	—
28. Corinth	International Paper	255	—	255	—	—	—
29. Deferiet	St. Regis Paper Co.	280	—	280	—	—	—
30. Deposit	Jim Walter Corp.	300	—	—	—	—	300
31. Fulton	Armstrong Cork	130	—	—	—	—	130
32. Glen Falls	Finch Pruyn & Co.	220	—	—	—	220	—
33. Lyons Falls	Georgia Pacific Corp.	120	—	—	120	—	—
34. Niagara Falls	Nitec Paper Corp.	100	—	100	—	—	—
35. Ogdenburg	Diamond International Corp.	110	—	110	—	—	—
36. Plattsburg	Diamond International Corp.	50	—	50	—	—	—
37. Plattsburg	Georgia Pacific Corp.	100	—	—	100	—	—
38. Ticonderoga	International Paper	500	500	—	—	—	—
Total (12 mills)		2,235	500	865	220	220	430
Ohio:							
39. Chillicothe	Mead Corporation	600	600	—	—	—	—
40. Cincinnati	Celotex Corporation	100	—	—	—	—	100
41. Circleville	Container Corp. of America	300	—	—	300	—	—
42. Coshocton	Stone Container Corp.	650	—	—	650	—	—
43. Franklin	Bird & Son, Inc.	80	—	—	—	—	80
44. Milan	Certain-Teed Corp.	90	—	—	—	—	90
Total (6 mills)		1,820	600	—	950	—	270
Pennsylvania:							
45. Erie	Hammermill Paper Co.	700	—	—	700	—	—
46. Johnsonburg	Penntech Paper	190	190	—	—	—	—
47. Mehoopany	Charmin Paper Products	b	—	—	—	c	—
48. Philadelphia	Jim Walter Corp.	160	—	—	—	—	160
49. Roaring Springs	Appleton Paper, Inc.	180	180	—	—	—	—
50. Spring Grove	P.H. Glatfelter Co.	525	525	—	—	—	—
51. Sunbury	Jim Walter Corp.	240	—	—	240	—	—
52. Towanda	Masonite Corp.	500	—	—	—	—	500
53. York	Certain-Teed Products Corp.	50	—	—	—	—	50
Total (9 mills)		2,545	895	—	940	c	710
Rhode Island:							
54. Phillipsdale	Bird and Son, Inc.	275	—	—	—	—	275
Total (1 mill)		275	—	—	—	—	275
Vermont:							
55. Sheldon Springs	Saxon Industries	50	—	50	—	—	—
Total (1 mill)		50	—	50	—	—	—
All northeast states (62 mills)		18,636	8,734	4,015	2,910	820	2,157

Location	Company name	Type of pulp produced (Capacity in tons/24 hrs.)					
		Total	Sulfate	Ground-wood	Semi-chemical	Sulfite	Miscellaneous [a]
OUTSIDE THE NORTHEAST							
Canada:							
56. Cornwall	Domtar Woodlands, Ltd.	400	400	—	—	—	—
57. East Angus	Domtar Woodlands, Ltd. [b]	340	220	—	120	—	—
58. Three Rivers	Kruger Pulp & Paper, Ltd. [b]	1,150	—	940	—	210	—
59. Windsor	Domtar Woodlands, Ltd.	500	500	—	—	—	—
Total (6 mills)		2,390	1,120	940	120	210	—
North Carolina:							
60. Canton	Champion International Corp.	1,385	1,385	—	—	—	—
Total (1 mill)		1,385	1,385	—	—	—	—
Michigan:							
61. Otsego	The Menasha Corp.	250	—	—	250	—	—
Total (1 mill)		250	—	—	250	—	—
Tennessee:							
62. Calhoun	Bowater Southern Paper Corp. [b]	1,625	500	925	—	200	—
63. Harriman	Harriman Paperboard Corp.	190	—	—	190	—	—
64. Kingsport	Mead Corporation	250	—	—	—	250	—
65. New Johnsonville	Inland Container Corp.	450	—	—	450	—	—
66. Paris	The Celotex Corp.	300	—	—	—	—	300
Total (7 mills)		2,815	500	925	640	450	300
Virginia:							
67. Covington	Westvaco Corp. [b]	1,210	1,050	—	160	—	—
68. West Point	Chesapeake Corp. of Va.	1,150	1,150	—	—	—	—
Total (3 mills)		2,360	2,200	—	160	—	—
Total all other states		9,200	5,205	1,865	1,170	660	300
Total all states		27,836	13,939	5,880	4,080	1,480	2,457

[a] Roofing, insulation board, and hard board plants.
[b] More than one pulpmill operating.
[c] Capacity unknown
* Mill no longer produces pulp.

Tabular data

Table 1.—Total production of pulpwood in the Northeast, by source and state, 1976. (In thousands of rough cords)
Table 2.—Total production and receipts of pulpwood in the Northeast, by state and species group, 1976. (In thousands of rough cords)
Table 3.—Pulpwood production from roundwood in the Northeast, by state and species group and destination of shipments, 1976. (In thousands of rough cords)
Table 4.—Pulpwood chip production from plant residues in the Northeast, by state and species group, 1976. (In thousands of rough cord equivalents)
Table 5.—Pulpwood receipts from roundwood in the Northeast, by state and species group, 1976. (In thousands of rough cords)
Table 6.—Pulpwood chip receipts from plant residues in the Northeast, by state and species group, 1976. (In thousands of rough cord equivalents)
Table 7.—Pulpwood from roundwood received from states outside the Northeast, by state (or province) of origin and species group, 1976. (In thousands of rough cords)
Table 8.—Pulpwood chip receipts from wood-using plants outside the Northeast, by state (or province) of origin and species group, 1976. (In thousands of rough cord equivalents)
Table 9.—Pulpwood production from roundwood in the Northeast, by state and species group, 1976. (In thousands of rough cords)
Table 10.—Pulpwood production from roundwood in Kentucky and Ohio, by state and county and species group. 1976. (In thousands of rough cords)
Table 11.—Pulpwood production from roundwood in Southern New England, by state and county and species group, 1976. (In thousands of rough cords)
Table 12.—Pulpwood production from roundwood in Northern New England, by state and county, and species group, 1976. (In thousands of rough cords)
Table 13.—Pulpwood production from roundwood in New York, by county and species group, 1976. (In thousands of rough cords)
Table 14.—Pulpwood production from roundwood in Pennsylvania, by county and species group, 1976. (In thousands of rough cords)
Table 15.—Pulpwood production from roundwood in Delaware, Maryland, and New Jersey, by state and county and species group, 1976. (In thousands of rough cords)
Table 16.—Pulpwood production from roundwood in West Virginia, by county and species group, 1976. (In thousands of rough cords)

Table 1.—*Total production of pulpwood in the Northeast, by source and state, 1976*

(In thousands of rough cords) [a]

State	Source		
	From roundwood	From plant residues	From all sources
Connecticut	6.2	2.4	8.6
Delaware	43.7	12.6	56.3
Kentucky	70.1	238.0	308.1
Maine	2,802.5	484.1	3,286.6
Maryland	173.6	108.3	281.9
Massachusetts	8.5	32.1	40.6
New Hampshire	187.8	140.1	327.9
New Jersey	22.5	7.5	30.0
New York	575.9	156.5	732.4
Ohio	270.3	112.7	383.0
Pennsylvania	625.2	284.3	909.5
Rhode Island	2.7	b	2.7
Vermont	171.6	44.6	216.2
West Virginia	213.2	149.9	363.1
All states	5,173.8	1,773.1	6,946.9

[a] 128 cubic feet of wood, bark, and air space.

[b] Less than 50 cord equivalents.

Table 2.—*Total production and receipts of pulpwood in the Northeast, by state and species group, 1976*

(In thousands of rough cords)

State	Total production		Total receipts		Production Surplus (+) or deficit (-)
	Softwood	Hardwood	Softwood	Hardwood	
Connecticut	5.5	3.1	(D)	(D)	+(D)
Delaware	44.7	11.6	—	—	+56.3
Kentucky	28.7	279.4	141.5	481.6	-315.0
Maine	2,306.9	979.7	2,612.5	1,048.6	-374.5
Maryland	174.5	107.4	161.4	269.5	-149.0
Massachusetts	24.4	16.2	—	—	+40.6
New Hampshire	155.3	172.6	56.8	248.9	+22.2
New Jersey	26.6	3.4	39.2	10.5	-19.7
New York	247.8	484.6	314.8	448.3	-30.7
Ohio	6.3	376.7	11.8	486.2	-115.0
Pennsylvania	56.2	853.3	205.6	911.8	-207.9
Rhode Island	.6	2.1	(D)	(D)	-(D)
Vermont	107.6	108.6	(D)	(D)	+(D)
West Virginia	59.1	304.0	—	—	+363.1
All states	3,244.2	3,702.7	3,575.7	3,912.0	-540.8

(D) Data withheld to avoid disclosure for individual mills.

Table 3.—*Pulpwood production from roundwood in the Northeast, by state and species group, and destination of shipments, 1976*

(In thousands of rough cords)

State	Softwood				Hardwood				
	Cut and retained in state	Shipped to other states		Total softwood	Cut and retained in state	Shipped to other states		Total hardwood	Total producti
		In Northeast	Outside Northeast			In Northeast	Outside Northeast		
Connecticut	3.4	0.9	—	4.3	—	1.9	—	1.9	6.
Delaware	—	18.0	20.4	38.4	—	4.9	0.4	5.3	43.
Kentucky	.1	—	17.7	17.8	23.9	21.0	7.4	52.3	70.
Maine	1,882.7	6.2	.5	1,889.4	874.0	39.1	—	913.1	2,802.
Maryland	25.3	40.5	46.1	111.9	55.8	5.6	.3	61.7	173.
Massachusetts	—	6.4	—	6.4	—	2.1	—	2.1	8.
New Hampshire	12.3	43.9	—	56.2	113.1	18.5	—	131.6	187.
New Jersey	21.4	—	—	21.4	1.1	a	—	1.1	22.
New York	187.2	2.3	28.3	217.8	306.0	23.8	28.3	358.1	575.
Ohio	—	6.3	—	6.3	264.0	—	—	264.0	270.
Pennsylvania	28.1	7.8	—	35.9	538.0	51.3	—	589.3	625.
Rhode Island	.6	—	—	.6	2.1	—	—	2.1	2.
Vermont	15.7	74.3	—	90.0	—	81.6	—	81.6	171.
West Virginia	—	51.0	2.6	53.6	—	82.7	76.9	159.6	213.
All states	2,176.8	257.6	115.6	2,550.0	2,178.0	332.5	113.3	2,623.8	5,173.

[a] Less than 50 cords.

Table 4.—*Pulpwood chip production from plant residues in the Northeast, by state and species group, 19*

(In thousands of rough-cord equivalents)

State	Softwood				Hardwood				
	Produced and retained in state	Shipped to other states		Total softwood	Produced and retained in state	Shipped to other states		Total hardwood	Tota produc n
		In Northeast	Outside Northeast			In Northeast	Outside Northeast		
Connecticut	—	1.2	—	1.2	—	1.2	—	1.2	2
Delaware	—	6.3	—	6.3	—	6.3	—	6.3	12
Kentucky	—	8.0	2.9	10.9	163.9	33.1	30.1	227.1	238
Maine	417.2	.3	—	417.5	62.6	4.0	—	66.6	484
Maryland	6.2	34.1	22.3	62.6	11.3	34.4	—	45.7	108
Massachusetts	—	18.0	—	18.0	—	14.1	—	14.1	32
New Hampshire	29.7	61.3	8.1	99.1	14.8	24.1	2.1	41.0	140
New Jersey	3.5	1.7	—	5.2	—	2.3	—	2.3	7
New York	18.2	11.8	—	30.0	49.1	62.6	14.8	126.5	156
Ohio	—	—	—	—	111.0	1.7	—	112.7	112
Pennsylvania	19.1	1.2	—	20.3	220.1	43.9	—	264.0	284
Rhode Island	—	—	—	—	—	a	—	a	a
Vermont	—	17.6	—	17.6	—	27.0	a	27.0	44
West Virginia	—	1.5	4.0	5.5	—	71.3	73.1	144.4	149
All states	493.9	163.0	37.3	694.2	632.8	326.0	120.1	1,078.9	1,773

[a] Less than 50 cord equivalents.

Table 5.—*Pulpwood receipts from roundwood in the Northeast, by state and species group, 1976*

(In thousands of rough cords)

State [a]	Softwood				Hardwood				
	Cut and retained in state	Receipts from other states		Total softwood	Cut and retained in state	Receipts from other states		Total hardwood	Total receipt
		In Northeast	Outside Northeast			In Northeast	Outside Northeast		
Connecticut	3.4	(D)	(D)	(D)	—	(D)	(D)	(D)	(D)
Kentucky	.1	—	107.6	107.7	23.9	—	80.1	104.0	211.7
Maine	1,882.7	24.8	178.2	2,085.7	874.0	18.3	69.6	961.9	3,047.6
Maryland	25.3	58.9	42.9	127.1	55.8	112.5	7.8	176.1	303.2
New Hampshire	12.3	9.9	—	22.2	113.1	102.2	7.3	222.6	244.8
New Jersey	21.4	.9	—	22.3	1.1	b	—	1.1	23.4
New York	187.2	89.7	.8	277.7	306.0	29.2	5.2	340.4	618.1
Ohio	—	—	—	—	264.0	28.2	4.0	296.2	296.2
Pennsylvania	28.1	66.1	39.3	133.5	538.0	37.8	.6	576.4	709.9
Rhode Island	.6	(D)	(D)	(D)	2.1	(D)	(D)	(D)	(D)
Vermont	15.7	(D)	(D)	(D)	—	(D)	(D)	(D)	(D)
All states	2,176.8	257.7	372.3	2,806.8	2,178.0	332.6	174.6	2,685.2	5,492.0

[a] States with no pulpmills are omitted.
(D) Data withheld to avoid disclosure for individual mills.
[b] Less than 50 cords.

Table 6.—*Pulpwood chip receipts from plant residues in the Northeast, by state and species group, 1976* [a]

(In thousands of rough-cord equivalents)

State [b]	Softwood				Hardwood				
	Produced and retained in state	Receipts from other states		Total softwood	Produced and retained in state	Receipts from other states		Total hardwood	Total receipts
		In Northeast	Outside Northeast			In Northeast	Outside Northeast		
Connecticut	—	(D)	(D)	(D)	—	(D)	(D)	(D)	(D)
Kentucky	—	—	33.8	33.8	163.9	—	213.7	377.6	411.4
Maine	417.2	71.7	37.9	526.8	62.6	23.2	.9	86.7	613.5
Maryland	6.2	1.4	26.7	34.3	11.3	75.0	7.1	93.4	127.7
New Hampshire	29.7	4.2	.7	34.6	14.8	8.1	3.4	26.3	60.9
New Jersey	3.5	13.4	—	16.9	—	9.4	—	9.4	26.3
New York	18.2	18.8	.1	37.1	49.1	42.0	16.8	107.9	145.0
Ohio	—	8.8	3.0	11.8	111.0	71.4	7.6	190.0	201.8
Pennsylvania	19.1	42.9	10.1	72.1	220.1	96.8	18.5	335.4	407.5
Rhode Island	—	(D)	(D)	(D)	—	(D)	(D)	(D)	(D)
Vermont	—	(D)	(D)	(D)	—	(D)	(D)	(D)	(D)
All states	493.9	162.7	112.3	768.9	632.8	326.0	268.0	1,226.8	1,995.7

[a] Includes sawmill slabs and edgings, sawdust, veneer cores, and post and pole trimmings.
[b] States with no pulpmills are omitted.
(D) Data withheld to avoid disclosure for individual mills.

Table 7.—*Pulpwood from roundwood received from states outside the Northeast, by state (or province) of origin and species group, 1976*

(In thousands of rough cords)

Receiving state [a]	State of province of origin	Total softwood	Total hardwood	All species
Kentucky	Illinois	1.6	10.7	12.3
	Indiana	—	18.6	18.6
	Mississippi	99.2	30.5	129.7
	Missouri	.2	9.1	9.3
	Tennessee	6.6	11.2	17.8
Maine	New Brunswick	176.0	59.1	235.1
	Quebec	2.2	10.5	12.7
Maryland	Virginia	42.9	7.8	50.7
New Hampshire	Quebec	—	7.3	7.3
New York	Ontario	.7	4.8	5.5
	Quebec	.1	.4	.5
Ohio	Indiana	—	4.0	4.0
Pennsylvania	Virginia	39.3	.6	39.9
Vermont	Quebec	3.5	—	3.5
All states		372.3	174.6	546.9

[a] States with no receipts are omitted.

Table 8.—*Pulpwood chip receipts from wood-using plants outside the Northeast, by state (or province) of origin and species group, 1976*

(In thousands of rough-cord equivalents)

Receiving state [a]	State or province of origin	Total softwood	Total hardwood	All species
Kentucky	Alabama	—	3.2	3.2
	Illinois	5.1	36.4	41.5
	Indiana	—	55.8	55.8
	Mississippi	28.7	16.0	44.7
	Missouri	—	65.0	65.0
	Tennessee	—	37.3	37.3
Maine	New Brunswick	4.4	.8	5.2
	Quebec	33.5	.1	33.6
Maryland	Virginia	26.7	7.1	33.8
New Hampshire	Quebec	.7	3.4	4.1
New York	Ontario	—	7.2	7.2
	Quebec	.1	9.6	9.7
Ohio	Indiana	—	3.3	3.3
	Virginia	3.0	4.3	7.3
Pennsylvania	Virginia	10.1	18.5	28.6
All states		112.3	268.0	380.3

[a] States with no receipts are omitted.

Table 9.—*Pulpwood production from roundwood in Northeast, by state and species group, 1976*

(In thousands of rough cords)

State	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Connecticut	—	—	4.3	4.3	—	0.9	1.0	1.9	6.2
Delaware	—	—	38.4	38.4	—	3.5	1.8	5.3	43.7
Kentucky	—	—	17.8	17.8	4.3	37.4	10.6	52.3	70.1
Maine	1,501.5	195.5	192.4	1,889.4	80.3	30.8	802.0	913.1	2,802.5
Maryland	—	.7	111.2	111.9	—	38.2	23.5	61.7	173.6
Massachusetts	.1	—	6.3	6.4	—	.8	1.3	2.1	8.5
New Hampshire	36.7	3.6	15.9	56.2	15.9	2.5	113.2	131.6	187.8
New Jersey	—	—	21.4	21.4	—	a	1.1	1.1	22.5
New York	88.7	50.2	78.9	217.8	42.2	25.8	290.1	358.1	575.9
Ohio	—	—	6.3	6.3	12.8	145.0	106.2	264.0	270.3
Pennsylvania	—	4.0	31.9	35.9	44.4	235.0	309.9	589.3	625.2
Rhode Island	—	—	.6	.6	—	1.0	1.1	2.1	2.7
Vermont	78.6	4.2	7.2	90.0	9.4	1.9	70.3	81.6	171.6
West Virginia	.2	3.9	49.5	53.6	.1	33.7	125.8	159.6	213.2
All states	1,705.8	262.1	582.1	2,550.0	209.4	556.5	1,857.9	2,623.8	5,173.8

[a] Less than 50 cords.

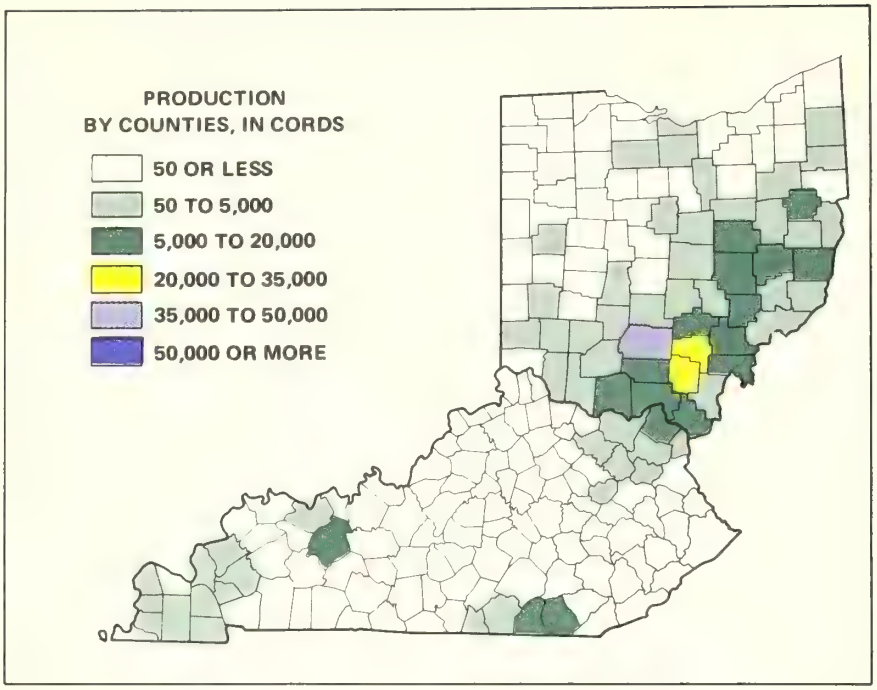


Figure 3.—Geographical pat tern of pulpwood productio from roundwood in Kentuck and Ohio by counties, 1976.

Table 10. ***Pulpwood production from roundwood in Kentucky and Ohio, by state and county and species group, 1976***

(In thousands of rough cords)

County [a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
				KENTUCKY					
Ballard	—	—	—	—	0.8	1.8	1.4	4.0	4.0
Bath	—	—	b	b	—	—	b	b	b
Boyd	—	—	—	—	b	.6	.1	.7	.7
Caldwell	—	—	—	—	.1	.2	.2	.5	.5
Calloway	—	—	—	—	.1	.4	.2	.7	.7
Carlisle	—	—	—	—	.6	1.3	1.0	2.9	2.9
Carter	—	—	b	b	.2	1.9	.3	2.4	2.4
Christian	—	—	—	—	—	b	b	b	b
Clinton	—	—	—	—	—	1.8	.4	2.2	2.2
Crittenden	—	—	—	—	.1	.2	.2	.5	.5
Daviess	—	—	—	—	—	.2	—	.2	.2
Elliot	—	—	—	—	b	.2	b	.2	.2
Fleming	—	—	—	—	.1	.9	.1	1.1	1.1
Floyd	—	—	b	b	—	—	—	—	b
Graves	—	—	—	—	.6	1.8	1.7	4.1	4.1
Greenup	—	—	—	—	1.0	9.6	1.4	12.0	12.0
Hickman	—	—	—	—	.2	.5	.5	1.2	1.2
Lewis	—	—	—	—	.3	3.0	.3	3.6	3.6
Livingston	—	—	—	—	.1	.2	.1	.4	.4
Lyon	—	—	0.1	0.1	.1	.3	.2	.6	.7
McCreary	—	—	5.7	5.7	—	.1	1.0	1.1	6.8
Marshall	—	—	—	—	—	b	.1	.1	.1
Menifee	—	—	b	b	b	.5	.1	.6	.6
Ohio	—	—	—	—	—	10.4	—	10.4	10.4
Rowan	—	—	b	b	b	.4	.1	.5	.5
Wayne	—	—	.4	.4	—	.4	.2	.6	1.0
Whitley	—	—	11.6	11.6	—	.7	1.0	1.7	13.3
Total	—	—	17.8	17.8	4.3	37.4	10.6	52.3	70.1

CONTINUED

Table 10.—Continued

County [a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
				OHIO					
Adams	—	—	—	—	0.7	4.9	2.1	7.7	7.7
Ashland	—	—	—	—	—	—	.4	.4	.4
Athens	—	—	1.3	1.3	.8	4.7	4.2	9.7	11.0
Belmont	—	—	—	—	—	—	10.3	10.3	10.3
Brown	—	—	b	b	.1	2.2	.3	2.6	2.6
Butler	—	—	—	—	—	—	.4	.4	.4
Carroll	—	—	—	—	—	—	6.5	6.5	6.5
Clermont	—	—	—	—	.4	2.9	1.1	4.4	4.4
Clinton	—	—	—	—	.2	3.7	.7	4.6	4.6
Coshocton	—	—	—	—	—	—	9.6	9.6	9.6
Crawford	—	—	—	—	—	—	b	b	b
Erie	—	—	—	—	—	—	.1	.1	.1
Fairfield	—	—	—	—	b	.9	.5	1.4	1.4
Fayette	—	—	—	—	b	.1	b	.1	.1
Gallia	—	—	.6	.6	.3	3.6	.5	4.4	5.0
Guernsey	—	—	—	—	—	—	6.6	6.6	6.6
Hardin	—	—	—	—	—	b	—	b	b
Harrison	—	—	—	—	—	—	2.3	2.3	2.3
Highland	—	—	—	—	.2	2.8	.4	3.4	3.4
Hocking	—	—	—	—	.8	5.0	2.6	8.4	8.4
Holmes	—	—	—	—	—	—	3.5	3.5	3.5
Huron	—	—	—	—	—	—	.6	.6	.6
Jackson	—	—	.1	.1	1.4	19.8	2.5	23.7	23.8
Jefferson	—	—	—	—	—	—	.2	.2	.2
Knox	—	—	—	—	—	—	1.5	1.5	1.5
Lawrence	—	—	.8	.8	.9	9.4	1.5	11.8	12.6
Licking	—	—	—	—	—	—	1.8	1.8	1.8
Lorain	—	—	—	—	—	—	b	b	b
Madison	—	—	—	—	—	.1	.1	.2	.2
Mahoning	—	—	1.9	1.9	—	—	—	—	1.9
Meigs	—	—	1.0	1.0	.4	6.9	.9	8.2	9.2
Monroe	—	—	—	—	—	—	2.0	2.0	2.0
Montgomery	—	—	—	—	—	—	.4	.4	.4
Morgan	—	—	—	—	—	—	5.6	5.6	5.6
Morrow	—	—	—	—	—	—	.4	.4	.4
Muskingum	—	—	—	—	—	—	11.5	11.5	11.5
Noble	—	—	—	—	—	—	3.7	3.7	3.7
Perry	—	—	—	—	.1	.2	3.6	3.9	3.9
Pickaway	—	—	—	—	.4	1.4	.7	2.5	2.5
Pike	—	—	—	—	.7	8.3	1.1	10.1	10.1
Ross	—	—	—	—	2.2	31.8	3.9	37.9	37.9
Scioto	—	—	b	b	1.1	13.3	1.9	16.3	16.3
Seneca	—	—	—	—	—	—	.1	.1	.1
Shelby	—	—	—	—	—	.1	b	.1	.1
Stark	—	—	—	—	—	—	1.3	1.3	1.3
Trumbull	—	—	.6	.6	—	—	—	—	.6
Tuscarawas	—	—	—	—	—	—	3.9	3.9	3.9
Vinton	—	—	—	—	2.1	22.9	3.9	28.9	28.9
Warren	—	—	—	—	—	—	.6	.6	.6
Washington	—	—	b	b	—	—	.4	.4	.4
Total	—	—	6.3	6.3	12.8	145.0	106.2	264.0	270.3

[a] Counties with no production are omitted.
[b] Less than 50 cords.

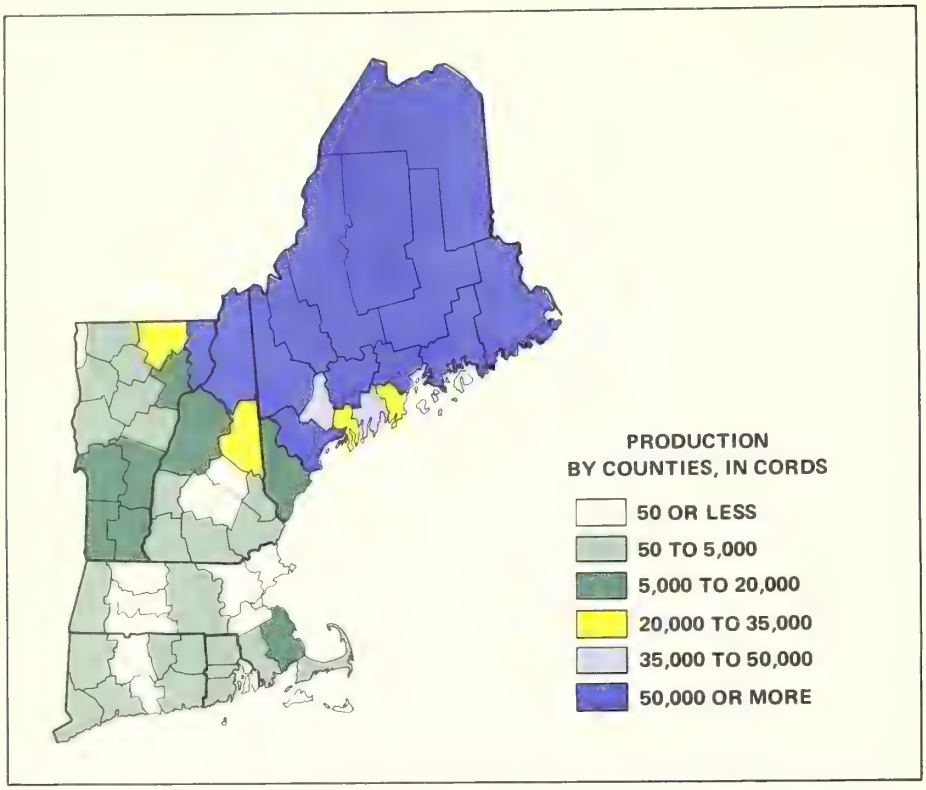


Figure 4.—Geographical pattern of pulpwood production from roundwood in the New England States, 1976.

Table 11.—*Pulpwood production from roundwood in Southern New England, by state and county and species group, 1976*

(In thousands of rough cords)

County [a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
CONNECTICUT									
Fairfield	—	—	1.2	1.2	—	—	—	—	1.2
Litchfield	—	—	.6	.6	—	—	—	—	.6
New Haven	—	—	1.7	1.7	—	—	—	—	1.7
New London	—	—	.1	.1	—	0.1	0.2	0.3	.4
Tolland	—	—	.1	.1	—	.1	.1	.2	.3
Windham	—	—	.6	.6	—	.7	.7	1.4	2.0
Total	—	—	4.3	4.3	—	0.9	1.0	1.9	6.2
MASSACHUSETTS									
Barnstable	—	—	0.5	0.5	—	—	—	—	0.5
Berkshire	0.1	—	—	.1	—	—	0.4	0.4	.5
Bristol	—	—	1.0	1.0	—	0.4	.4	.8	1.8
Plymouth	—	—	4.3	4.3	—	.4	.5	.9	5.2
Worcester	—	—	.5	.5	—	—	—	—	.5
Total	0.1	—	6.3	6.4	—	0.8	1.3	2.1	8.5
RHODE ISLAND									
Kent	—	—	0.2	0.2	—	0.5	0.6	1.1	1.3
Providence	—	—	.3	.3	—	.3	.3	.6	.9
Washington	—	—	.1	.1	—	.2	.2	.4	.5
Total	—	—	0.6	0.6	—	1.0	1.1	2.1	2.7

[a] Counties with no production are omitted.

Table 12.—*Pulpwood production from roundwood in Northern New England, by state and county and species group, 1976*

(In thousands of rough cords)

County [a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
MAINE									
Androscoggin	3.6	6.1	16.0	25.7	1.6	0.6	15.8	18.0	43.7
Aroostook	430.0	12.4	6.0	448.4	10.4	4.0	104.3	118.7	567.1
Cumberland	2.8	5.6	19.2	27.6	2.1	.8	20.9	23.8	51.4
Franklin	32.9	8.1	6.0	47.0	8.8	3.4	88.3	100.5	147.5
Hancock	27.4	5.8	5.5	38.7	1.6	.6	16.4	18.6	57.3
Kennebec	7.0	11.3	20.5	38.8	2.3	.9	22.6	25.8	64.6
Knox	7.2	4.8	9.4	21.4	.8	.3	8.4	9.5	30.9
Lincoln	6.0	7.2	16.2	29.4	1.4	.5	14.1	16.0	45.4
Oxford	60.3	20.6	25.6	106.5	14.3	5.5	142.4	162.2	268.7
Penobscot	147.1	40.7	10.1	197.9	8.0	3.1	79.7	90.8	288.7
Piscataquis	324.4	11.4	3.1	338.9	8.2	3.1	81.5	92.8	431.7
Sagadahoc	3.5	2.6	10.6	16.7	.5	.2	4.5	5.2	21.9
Somerset	263.8	14.1	14.8	292.7	5.8	2.2	58.1	66.1	358.8
Waldo	17.9	6.1	12.3	36.3	1.4	.5	14.1	16.0	52.3
Washington	167.0	36.4	8.6	212.0	12.4	4.8	123.9	141.1	353.1
York	.6	2.3	8.5	11.4	.7	.3	7.0	8.0	19.4
Total	1,501.5	195.5	192.4	1,889.4	80.3	30.8	802.0	913.1	2,802.5
NEW HAMPSHIRE									
Carroll	1.0	0.7	12.1	13.8	0.4	0.1	16.4	16.9	30.7
Cheshire	.2	—	—	.2	—	—	.1	.1	.3
Coos	32.5	2.5	3.0	38.0	13.1	1.6	84.0	98.7	136.7
Grafton	1.9	.4	.3	2.6	2.2	.6	10.5	13.3	15.9
Hillsborough	—	—	b	b	—	.1	.1	.2	.2
Merrimack	b	—	—	b	—	—	—	—	b
Rockingham	—	—	.4	.4	—	b	.3	.3	.7
Strafford	.1	b	.1	.2	.2	.1	1.7	2.0	2.2
Sullivan	1.0	b	—	1.0	.1	—	—	.1	1.1
Total	36.7	3.6	15.9	56.2	16.0	2.5	113.1	131.6	187.8
VERMONT									
Addison	1.1	0.2	0.4	1.7	0.1	0.1	1.6	1.8	3.5
Bennington	2.0	.2	.1	2.3	.2	.2	5.1	5.5	7.8
Caledonia	12.7	.3	.9	13.9	.7	.1	2.9	3.7	17.6
Chittenden	1.0	b	1.1	2.1	.2	b	.8	1.0	3.1
Essex	35.0	1.0	.4	36.4	5.2	.9	50.9	57.0	93.4
Franklin	.3	—	—	.3	—	—	b	b	.3
Lamoille	1.4	.2	—	1.6	—	—	.6	.6	2.2
Orange	—	.1	b	.1	b	b	.2	.2	.3
Orleans	16.6	1.0	.4	18.0	1.0	.2	1.1	2.3	20.3
Rutland	2.7	b	2.3	5.0	.6	.1	2.0	2.7	7.7
Washington	1.2	—	—	1.2	.4	—	.4	.8	2.0
Windham	1.8	.3	.2	2.3	b	.2	3.2	3.4	5.7
Windsor	2.8	.9	1.4	5.1	1.0	.1	1.5	2.6	7.7
Total	78.6	4.2	7.2	90.0	9.4	1.9	70.3	81.6	171.6

[a] Counties with no production are omitted.
[b] Less than 50 cords.

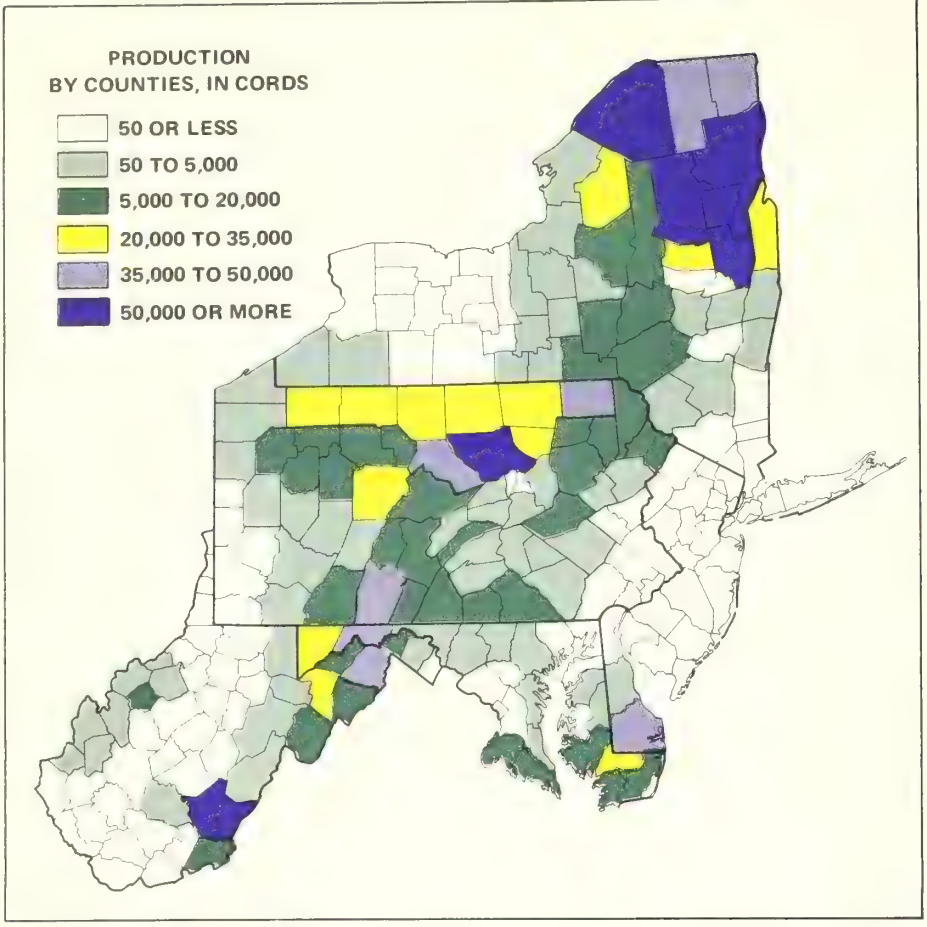


Figure 5.—Geographical pattern of pulpwood production from roundwood in the Middle Atlantic States, 1976.

Table 13.—*Pulpwood production from roundwood in New York, by county and species group, 1976*

(In thousands of rough cords)

County [a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Albany	0.2	—	1.5	1.7	b	—	—	b	1.7
Broome	—	-	—	—	0.6	1.9	4.7	7.2	7.2
Cattaraugus	—	—	2.0	2.0	—	.6	.3	.9	2.9
Cayuga	.3	—	—	.3	b	—	—	b	.3
Chautauqua	—	—	—	—	—	—	1.2	1.2	1.2
Chemung	—	b	—	b	.8	1.8	1.7	4.3	4.3
Chenango	7.1	—	.6	7.7	.3	.7	3.3	4.3	12.0
Clinton	9.1	3.7	10.0	22.8	6.6	3.4	13.8	23.8	46.6
Columbia	—	—	.1	.1	.1	—	b	.1	.2
Cortland	.4	—	—	.4	.1	.1	.1	.3	.7
Delaware	4.2	—	.2	4.4	.1	.3	2.1	2.5	6.9
Essex	3.2	4.4	8.8	16.4	4.3	1.9	56.3	62.5	78.9
Franklin	18.5	4.5	5.7	28.7	3.6	3.0	12.8	19.4	48.1
Fulton	.1	5.3	5.3	10.7	1.1	b	18.0	19.1	29.8
Green	—	b	—	b	—	—	—	—	b
Hamilton	5.5	3.6	1.3	10.4	3.2	1.8	44.4	49.4	59.8
Herkimer	5.2	.3	.6	6.1	1.0	.2	10.2	11.4	17.5
Jefferson	.6	—	1.6	2.2	.6	—	.7	1.3	3.5
Lewis	6.3	.2	2.0	8.5	3.1	.1	21.5	24.7	33.2
Madison	1.4	—	.9	2.3	.1	b	b	.1	2.4
Montgomery	—	—	b	b	b	—	—	b	b
Oneida	2.6	b	3.1	5.7	.5	b	3.2	3.7	9.4
Onondaga	—	—	—	—	b	b	.1	.1	.1

CONTINUED

Table 13.—Continued

County [a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Oswego	.1	—	.4	.5	.1	b	.5	.6	1.1
Otsego	1.7	—	6.1	7.8	.1	—	.1	.1	7.9
Rennselaer	.2	.2	.5	.9	.1	.4	3.0	3.5	4.4
St. Lawrence	19.2	4.9	6.1	30.2	7.7	3.5	12.9	24.1	54.3
Saratoga	.2	8.7	8.1	17.0	4.3	2.0	29.5	35.8	52.8
Schenectady	—	—	—	—	b	—	—	b	b
Schoharie	.5	b	.8	1.3	—	—	b	b	1.3
Sullivan	—	—	.3	.3	—	—	—	—	.3
Tioga	—	—	—	—	.4	.7	2.4	3.5	3.5
Tompkins	—	—	—	—	.3	1.2	2.4	3.9	3.9
Ulster	—	—	—	—	—	b	.1	.1	.1
Warren	2.0	8.7	8.2	18.9	2.7	.6	32.8	36.1	55.0
Washington	.1	5.7	4.7	10.5	.4	1.6	12.1	14.1	24.6
Total	88.7	50.2	78.9	217.8	42.2	25.8	290.1	358.1	575.9

[a] Counties with no production are omitted.
[b] Less than 50 cords.

Table 14.—*Pulpwood production from roundwood in Pennsylvania, by county and species group, 1976*

(In thousands of rough cords)

County [a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Adams	—	—	0.9	0.9	—	5.4	2.6	8.0	8.9
Armstrong	—	—	—	—	—	.2	b	.2	.2
Bedford	—	0.5	8.7	9.2	—	15.0	21.8	36.8	46.0
Berks	—	—	.2	.2	—	b	—	b	.2
Blair	—	—	1.1	1.1	0.1	2.6	6.2	8.9	10.0
Bradford	—	—	—	—	5.6	7.9	12.9	26.4	26.4
Bucks	—	—	—	—	—	b	—	b	b
Butler	—	—	—	—	—	.5	—	.5	.5
Cambria	—	—	1.3	1.3	—	.1	.1	.2	1.5
Cameron	—	—	—	—	—	18.4	.8	19.2	19.2
Carbon	—	—	b	b	—	.2	.1	.3	.3
Centre	—	0.1	.6	.7	.6	8.5	6.6	15.7	16.4
Chester	—	—	—	—	—	b	—	b	b
Clarion	—	.1	—	.1	—	5.5	.2	5.7	5.8
Clearfield	—	2.6	1.3	3.9	1.3	11.2	9.8	22.3	26.2
Clinton	—	.2	b	.2	2.1	19.9	19.2	41.2	41.4
Columbia	—	—	—	—	.2	1.1	1.5	2.8	2.8
Crawford	—	—	—	—	—	b	.7	.7	.7
Cumberland	—	—	.2	.2	—	2.4	1.2	3.6	3.8
Dauphin	—	—	b	b	.1	1.2	.4	1.7	1.7
Elk	—	—	—	—	—	.8	18.2	19.0	19.0
Erie	—	—	—	—	—	—	1.2	1.2	1.2
Fayette	—	—	.1	.1	—	.4	.4	.8	.9
Forest	—	—	—	—	—	3.5	12.9	16.4	16.4
Franklin	—	—	1.0	1.0	—	7.2	3.7	10.9	11.9
Fulton	—	—	2.3	2.3	—	3.0	3.8	6.8	9.1
Huntingdon	—	.3	2.2	2.5	.3	8.0	4.0	12.3	14.8
Indiana	—	—	1.1	1.1	—	.1	b	.1	1.2
Jefferson	—	—	—	—	—	4.3	11.7	16.0	16.0
Juniata	—	—	.9	.9	b	3.5	1.7	5.2	6.1
Lackawanna	—	—	—	—	.4	2.2	2.9	5.5	5.5
Lancaster	—	—	.1	.1	—	.7	.3	1.0	1.1
Lebanon	—	—	b	b	b	.4	.3	.7	.7
Luzerne	—	—	—	—	.4	2.5	2.7	5.6	5.6
Lycoming	—	—	—	—	6.7	23.9	22.6	53.2	53.2
McKean	—	—	—	—	9.6	—	17.4	27.0	27.0
Mercer	—	—	—	—	—	.9	1.4	2.3	2.3
Mifflin	—	—	b	b	—	.4	.2	.6	.6
Monroe	—	—	—	—	.2	.8	1.0	2.0	2.0
Northumberland	—	—	b	b	—	.2	b	.2	.2

CONTINUED

Table 14.—Continued

County [a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Perry	—	—	1.0	1.0	b	1.9	1.0	2.9	3.9
Pike	—	—	3.6	3.6	.2	4.4	1.2	5.8	9.4
Potter	—	—	—	—	1.2	1.2	21.6	24.0	24.0
Schuylkill	—	—	.2	.2	.2	3.2	2.2	5.6	5.8
Snyder	—	—	.3	.3	—	.4	.1	.5	.8
Somerset	—	b	.7	.7	.1	6.5	6.7	13.3	14.0
Sullivan	—	—	—	—	5.5	6.2	15.4	27.1	27.1
Susquehanna	—	—	—	—	3.8	14.9	21.3	40.0	40.0
Tioga	—	.2	—	.2	3.6	5.1	13.7	22.4	22.6
Union	—	—	.1	.1	b	3.1	1.0	4.1	4.2
Venango	—	—	—	—	—	11.4	—	11.4	11.4
Warren	—	—	—	—	—	5.1	23.7	28.8	28.8
Wayne	—	—	—	—	1.1	3.8	6.7	11.6	11.6
Westmoreland	—	—	.1	.1	—	—	b	b	.1
Wyoming	—	—	—	—	1.1	2.6	3.9	7.6	7.6
York	—	—	3.9	3.9	—	2.3	.9	3.2	7.1
Total	—	4.0	31.9	35.9	44.4	235.0	309.9	589.3	625.2

[a] Counties with no production are omitted.
[b] Less than 50 cords.

Table 15.—*Pulpwood production from roundwood in Delaware, Maryland, and New Jersey, by state and county and species group, 1976*

(In thousands of rough cords)

County [a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
DELAWARE									
Kent	—	—	4.0	4.0	—	0.1	—	0.1	4.1
Sussex	—	—	34.4	34.4	—	3.4	1.8	5.2	39.6
Total	—	—	38.4	38.4	—	3.5	1.8	5.3	43.7
MARYLAND									
Allegany	—	0.5	5.0	5.5	—	20.4	10.6	31.0	36.5
Anne Arundel	—	—	3.4	3.4	—	—	—	—	3.4
Baltimore	—	—	1.7	1.7	—	.1	—	.1	1.8
Calvert	—	—	4.2	4.2	—	.1	.1	.2	4.4
Caroline	—	—	1.3	1.3	—	b	—	b	1.3
Carroll	—	—	1.8	1.8	—	.4	.1	.5	2.3
Cecil	—	—	b	b	—	—	—	—	b
Charles	—	—	9.1	9.1	—	b	—	b	9.1
Dorchester	—	—	6.2	6.2	—	.1	—	.1	6.3
Frederick	—	—	.4	.4	—	1.2	.5	1.7	2.1
Garrett	—	.2	2.0	2.2	—	14.0	11.2	25.2	27.4
Harford	—	—	b	b	—	—	—	—	b
Howard	—	—	—	—	—	b	—	b	b
Kent	—	—	b	b	—	—	—	—	b
Queen Annes	—	—	.1	.1	—	—	—	—	.1
St. Marys	—	—	9.3	9.3	—	.4	—	.4	9.7
Somerset	—	—	12.7	12.7	—	b	b	b	12.7
Talbot	—	—	b	b	—	—	—	—	b
Washington	—	—	1.5	1.5	—	1.2	.9	2.1	3.6
Wicomico	—	—	32.7	32.7	—	.3	.1	.4	33.1
Worcester	—	—	19.8	19.8	—	b	—	b	19.8
Total	—	0.7	111.2	111.9	—	38.2	23.5	61.7	173.6

CONTINUED

Table 15.—Continued

County [a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
NEW JERSEY									
Atlantic	—	—	2.8	2.8	—	—	.2	.2	3.0
Burlington	—	—	6.4	6.4	—	—	—	—	6.4
Camden	—	—	4.0	4.0	—	b	—	b	4.0
Cape May	—	—	1.6	1.6	—	—	.4	.4	2.0
Gloucester	—	—	1.5	1.5	—	—	.5	.5	2.0
Ocean	—	—	4.5	4.5	—	—	—	—	4.5
Sussex	—	—	.6	.6	—	—	—	—	.6
Total	—	—	21.4	21.4	—	b	1.1	1.1	22.5

[a] Counties with no production are omitted.
[b] Less than 50 cords.

Table 16.—*Pulpwood production from roundwood in West Virginia by county and species group, 1976*

(In thousands of rough cords)

County [a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Barbour	—	—	—	—	—	—	b	b	b
Berkeley	—	0.3	1.1	1.4	—	1.2	0.6	1.8	3.2
Boone	—	—	—	—	—	—	b	b	b
Cabel	—	—	.6	.6	—	—	—	—	.6
Calhoun	—	—	b	b	—	—	—	—	b
Doddridge	—	—	b	b	—	—	b	b	b
Fayette	—	—	—	—	—	—	.4	.4	.4
Grant	—	.6	3.6	4.2	—	—	18.5	18.5	22.7
Greenbrier	—	—	.8	.8	—	—	61.6	61.6	62.4
Hampshire	—	1.0	13.9	14.9	—	10.0	10.4	20.4	35.3
Hardy	—	1.0	5.7	6.7	—	4.0	1.9	5.9	12.6
Harrison	—	—	b	b	—	—	—	—	b
Jackson	—	—	1.9	1.9	—	—	—	—	1.9
Kanawha	—	—	b	b	—	—	—	—	b
Lewis	—	—	b	b	—	—	—	—	b
Lincoln	—	—	b	b	—	—	—	—	b
McDowell	—	—	b	b	—	—	—	—	b
Marshal	—	—	b	b	—	—	—	—	b
Mason	—	—	1.1	1.1	0.1	.6	.1	.8	1.9
Mercer	—	—	—	—	—	—	b	b	b
Mineral	—	.5	2.5	3.0	—	6.0	6.2	12.2	15.2
Monroe	—	—	1.6	1.6	—	—	11.4	11.4	13.0
Morgan	—	.4	5.3	5.7	—	4.0	2.5	6.5	12.2
Pendleton	—	—	1.4	1.4	—	—	4.9	4.9	6.3
Pleasants	—	—	.1	.1	—	2.1	—	2.1	2.2
Pocahontas	0.2	.1	.4	.7	—	1.0	2.5	3.5	4.2
Preston	—	—	b	b	—	—	.2	.2	.2
Putnam	—	—	1.1	1.1	—	—	—	—	1.1
Raleigh	—	—	—	—	—	—	b	b	b
Randolph	—	—	.5	.5	—	—	3.3	3.3	3.8
Ritchie	—	—	.5	.5	—	—	b	b	.5
Summers	—	—	b	b	—	—	b	b	b
Taylor	—	—	b	b	—	—	—	—	b
Tucker	—	—	.1	.1	—	.5	.5	1.0	1.1
Wirt	—	—	6.9	6.9	—	—	.8	.8	7.7
Wood	—	—	.4	.4	—	4.3	—	4.3	4.7
Total	0.2	3.9	49.5	53.6	0.1	33.7	125.8	159.6	213.2

[a] Counties with no production are omitted.
[b] Less than 50 cords.

Headquarters of the Northeastern Forest Experiment Station are in Upper Darby, Pa. Field laboratories and research units are maintained at:

- Amherst, Massachusetts, in cooperation with the University of Massachusetts.
- Beltsville, Maryland.
- Berea, Kentucky, in cooperation with Berea College.
- Burlington, Vermont, in cooperation with the University of Vermont.
- Delaware, Ohio.
- Durham, New Hampshire, in cooperation with the University of New Hampshire.
- Hamden, Connecticut, in cooperation with Yale University.
- Kingston, Pennsylvania.
- Morgantown, West Virginia, in cooperation with West Virginia University, Morgantown.
- Orono, Maine, in cooperation with the University of Maine, Orono.
- Parsons, West Virginia.
- Pennington, New Jersey.
- Princeton, West Virginia.
- Syracuse, New York, in cooperation with the State University of New York College of Environmental Sciences and Forestry at Syracuse University, Syracuse.
- Warren, Pennsylvania.

Bones, James T., and David R. Dickson.
1977. **Pulpwood—1976.** Northeast.For. Exp. Stn., Upper Darby, Pa.
23 p, illus. (U.S. Dep. Agric. For. Serv. Resource Bull. NE-53)

An annual assessment of regional timber output based upon canvasses of the pulpmills in the Northeast. Contains data about pulpwood production from roundwood in the 14 northeastern states by counties and species groups, pulpwood chip production from plant residues, and production of total-tree chips. Pulpwood production between 1975 and 1976 increased 14 percent; roundwood production was up 12 percent and chipped residue production was up 21 percent. Trends in pulpwood production for the past 14 years are shown along with a list of the woodpulp mills that received northeastern pulpwood during 1976.

861.0(74):721:792

Keywords: Pulpwood, Northeast, timber output

Bones, James T., and David R. Dickson.
1977. **Pulpwood—1976.** Northeast.For. Exp. Stn., Upper Darby, Pa.
23 p, illus. (U.S. Dep. Agric. For. Serv. Resource Bull. NE-53)

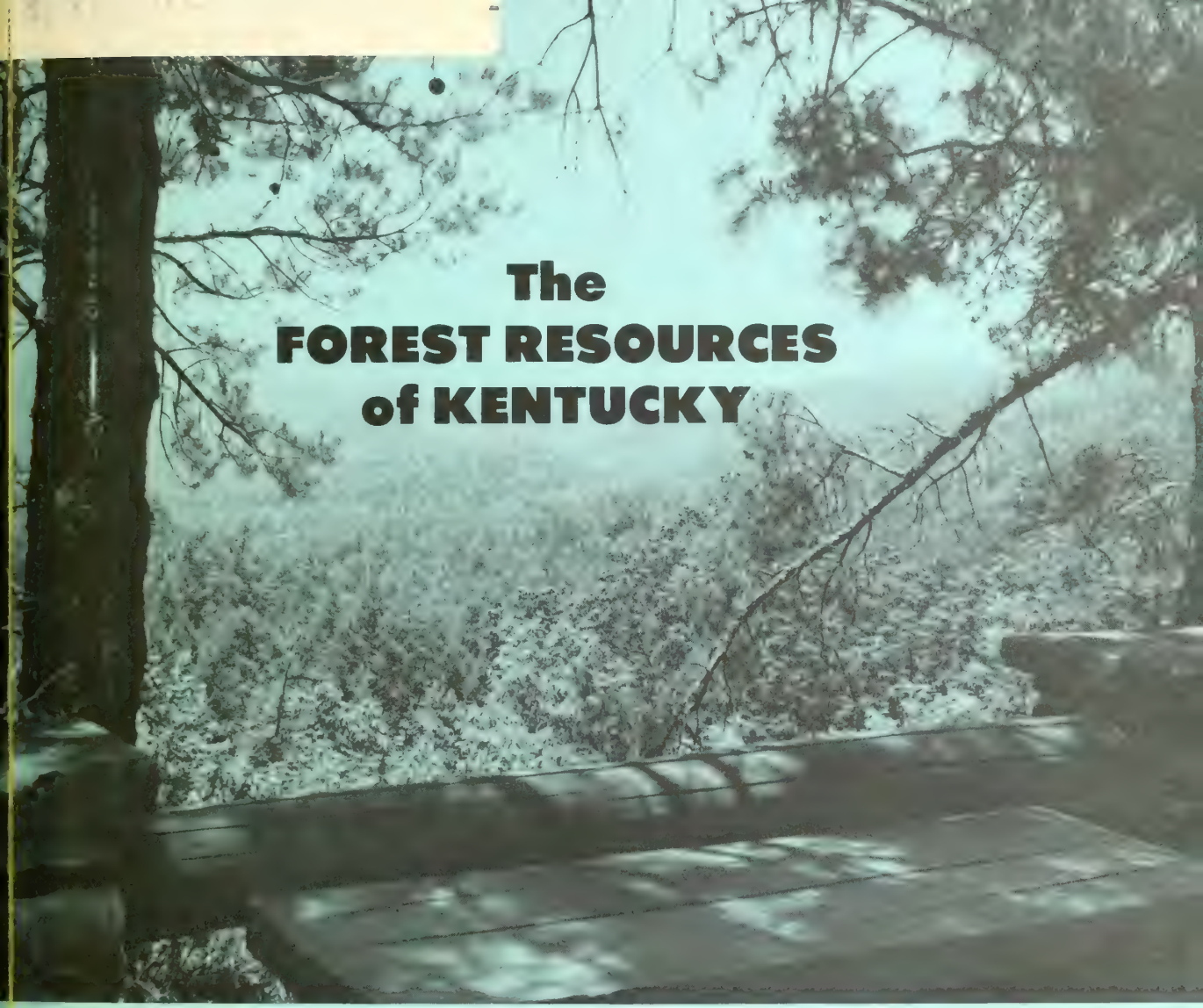
An annual assessment of regional timber output based upon canvasses of the pulpmills in the Northeast. Contains data about pulpwood production from roundwood in the 14 northeastern states by counties and species groups, pulpwood chip production from plant residues, and production of total-tree chips. Pulpwood production between 1975 and 1976 increased 14 percent; roundwood production was up 12 percent and chipped residue production was up 21 percent. Trends in pulpwood production for the past 14 years are shown along with a list of the woodpulp mills that received northeastern pulpwood during 1976.

861.0(74):721:792

Keywords: Pulpwood, Northeast, timber output

FOREST SERVICE
U.S. DEPARTMENT OF AGRICULTURE
LIBRARY RATE — EDUCATIONAL MATERIAL
UPPER DARBY, PENNA. 19082

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300



The FOREST RESOURCES of KENTUCKY

GOVT. DOCUMENTS
DEPOSITORY ITEM
JUL 20 1978
CLEMSON
LIBRARY

CLEMSON UNIVERSITY LIBRARY
JUL 31 1978

FOREST SERVICE RESOURCE BULLETIN NE-54
1978
FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE
NORTHEASTERN FOREST EXPERIMENT STATION
370 REED ROAD, BROOMALL, PA. 19008

FOREWORD

UNDER THE AUTHORITY of the McSweeney-McNary Forest Research Act of May 22, 1928, as amended, and the Renewable Natural Resources Planning Act of 1974 as amended, the Forest Service of the U. S. Department of Agriculture, conducts periodic inventories and makes evaluations of the forest resources of all states to provide up-to-date information about the forest resources of the Nation.

The first forest inventory of Kentucky was made in 1949 by the Central States Forest Experiment Station. A second survey was conducted by the same unit in 1963.

The third survey was made in 1973, 1974, and 1975 by the Northeastern Forest Experiment Station. As in the previous surveys, the Forest Service had the cooperation of many individuals and agencies. Special thanks are due former State Forester Harry M. Nadler and the personnel of the Division of Forestry of the Kentucky Department for Natural Resources and Environmental Protection.

The third inventory of Kentucky was directed by Carl E. Mayer, Resources Evaluation unit Leader. Joseph E. Barnard was responsible for the design of the inventory and sample selection as well as for supervision of data compilation. John R. Peters supervised the aerial-photo interpretation and data collection by field crews. David R. Dickson applied the generalized data-processing system, FINSYS, to the specific data needs of the Kentucky inventory and produced summary tables for the State, geographic sampling units, and counties. Teresa M. Bowers assisted in the inventory design by performing all calculations necessary for sample-size determination and plot selection. She was responsible for the coordination of key punching and other data-preparation tasks, and the final preparation and statistical checking of tables for the report. James T. Bones, with the assistance of State personnel, collected and compiled the data on timber-products output and timber removals. He was assisted in the compilation phase by David R. Dickson and Teresa M. Bowers. Carmela M. Hyland was responsible for administrative and secretarial services.

Joseph E. Barnard and the senior author checked the consistency of the new inventory with previous inventories. They made frequent use of the TRAS (Timber Resource Analysis System) forest-stand simulation model in this phase of the data analysis and in the 30-year projections of timber volume.

The photo-interpretation phase of this inventory was completed in March 1975 and the last field plot was measured in November 1975. Final computer output was available in July 1976. Users of this report who need more detailed information should contact the Resources Evaluation unit, Northeastern Forest Experiment Station, 370 Reed Road, Broomall, Pa. 19008.

Users of this report are strongly advised to read carefully the definitions of forest-survey terms and the section on the reliability of the estimates in the appendix of this report.

THE AUTHORS

NEAL P. KINGSLEY, research forester, received his bachelor of science degree in forestry from the University of New Hampshire in 1961 and his master of science degree in forest economics from the same university in 1963. He joined the Northeastern Forest Experiment Station in August 1962, and is now Resource Analysis Team Leader in the Northeastern Station's Resources Evaluation unit, located in Broomall, Pa.

DOUGLAS S. POWELL, research forester, received his bachelor of science degree in forestry from the University of Michigan in 1971 and his master of science degree in forest ecology from West Virginia University in 1976. He joined the Northeastern Forest Experiment Station in July 1971, and is now a Resource Analyst in the Station's Resources Evaluation unit.

MANUSCRIPT RECEIVED FOR PUBLICATION 29 SEPTEMBER 1977

by Neal P. Kingsley and Douglas S. Powell

The Forest Resources of Kentucky

CONTENTS

HIGHLIGHTS 1
THE THIRD LOOK 2
Seven geographic units 2
Comparisons between inventories 3
HISTORICAL BACKGROUND 4
FOREST AREA 5
Forest-land ownership 6
Forest types 7
Stand-size classes 8
TIMBER VOLUME 9
Sawlog quality 10
Volume by species 11
Volume by forest type groups 15
Volume per acre 15
GROWTH AND REMOVALS 18
How the inventory changes 18
Species removals 19
TIMBER-PRODUCTS OUTPUT 20
Lumber and sawlogs 20
Pulpwood 22
Veneer logs and bolts 23
Cooperage-log production 24
The place of timber in the economy of Kentucky 24
TIMBER-SUPPLY OUTLOOK 26
TIMBER-MANAGEMENT OPPORTUNITIES 28
THE FOREST-RELATED RESOURCES OF KENTUCKY 29
Water 29
Soil 32
Coal 34
Fish and wildlife 37
Outdoor recreation 40
LITERATURE CITED 44
APPENDIX 45
Definition of Terms 45
Log-Grade Classification 48
Forest Survey Methods 51
Reliability of the Estimates 53
Commercial Tree Species of Kentucky 53
INDEX TO TABLES 55

Kentucky Division of Forestry Photo.

Cover Photo: **View from Pine Mountain State Park, Bell County.**

ABSTRACT

The findings in this statistical and analytical report on the third forest survey of Kentucky, conducted in 1973, 1974, and 1975, are based on both remeasured and new 10-point cluster plots. The present status and trends in forest-land area, timber volume, and annual growth and removals are discussed. Timber-products output by forest industries, based upon a canvass of industries in 1974, and the importance of timber to the economy of the State are also discussed. The report includes a discussion of the outlook for timber supplies through 2004, and forest-management opportunities in the State. The status and importance of the nontimber forest resources of Kentucky are also discussed.

HIGHLIGHTS

★ Kentucky has 11.9 million acres of commercial forest land, 47 percent of its land area. This represents a small but steady increase since 1949.

★ One-half of the commercial forest land is in the eastern third of the State.

★ Ninety-two percent of the commercial forest land is owned by an estimated 455,600 private owners—261,000 own fewer than 10 acres. The average size of privately owned forest tracts is 24.2 acres.

★ Oak-hickory stands dominate—63 percent of the commercial forest-land area, and 69 percent of the growing-stock volume.

★ Growing-stock and sawtimber volume increased by 23 and 24 percent, respectively, since 1963.

★ Thirty percent of the hardwood sawtimber volume is grade-1 and -2 material—50 percent is grade 3.

★ In order of decreasing volume, white oak, black oak, and yellow-poplar are the most abundant species.

★ From 1962 to 1974, the growing-stock inventory increased by an average of 179.8 million cubic feet each year.

★ From 1962 to 1974, timber removals averaged only 38 percent of growth for the growing-stock inventory, and 49 percent for the sawtimber inventory. All species are growing faster than they are being cut.

★ The gap between growth and removals is expected to continue to widen through 2004.

★ Ownership patterns are seen as the biggest challenge to forest management in Kentucky.

★ Kentucky is blessed with a variety of nontimber forest resources that provide plentiful benefits to Kentuckians and nonresidents alike.

THE THIRD LOOK

In 1949, the U.S. Forest Service with the cooperation of other state and federal agencies conducted the first in this series of periodic forest inventories of Kentucky (Hutchinson and Winters 1953). Fourteen years later, the second inventory was conducted (Gansner 1968). This third survey, some 12 years later, shows that the forest resources of Kentucky have continued to change.

This report is a statistical and analytical presentation of the results of this third survey; present timber resources and the changes that have taken place are examined. Trends in timber supply, landowner attitudes, and timber availability are discussed. Projections of future timber supply are made and discussed. Because timber is not all there is to a forest, many of the resources and benefits that are affected by forests or that affect the forest are also discussed.

Seven geographic units

To provide more meaningful regional information, Kentucky has been divided into seven geographic sampling units (Fig. 1). These units consists of groups of counties that are as similar in land characteristics as possible. These sampling units range from slightly more than 700,000 acres of commercial forest land to more than 2 million acres. Because these sampling units are the same as those used in the previous inventory, comparisons of trends in the forest resource can be made for portions of the State.

Eastern Unit

8 Counties
LAND AREA: 2,134,500 acres
COMMERCIAL FOREST: 88 percent
POPULATION: 218,895[1]
RURAL POPULATION: 90 percent[1]
POPULATION DENSITY: 66 per square mile[1]
PER CAPITA INCOME: $1,534[2]

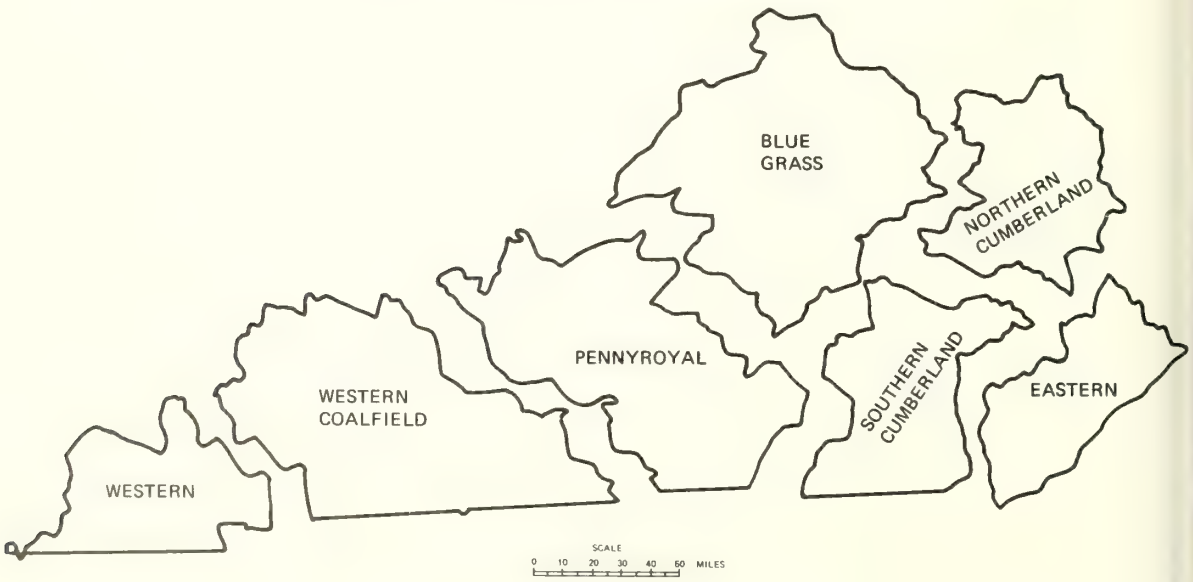
This unit contains some of the most important coal-producing counties in Kentucky, yet it is the most forested of the seven units. This region is the heartland of the Appalachians in Kentucky.

Northern Cumberland Unit

13 Counties
LAND AREA: 2,495,900 acres
COMMERCIAL FOREST: 74 percent
POPULATION: 206,866[1]
RURAL POPULATION: 69 percent[1]
POPULATION DENSITY: 53 per square mile[1]
PER CAPITA INCOME: $1,987[2]

[1] U.S. Bureau of the Census 1971.
[2] U.S. Bureau of the Census 1972.

Figure 1.—Geographic units of Kentucky.



This is the northern portion of the Cumberland Plateau in Kentucky. This is a rural area with steep slopes and narrow valleys poorly suited to agriculture.

Southern Cumberland Unit

12 Counties
LAND AREA: 2,782,600 acres
COMMERCIAL FOREST: 78 percent
POPULATION: 198,229[1]
RURAL POPULATION: 82 percent[1]
POPULATION DENSITY: 46 per square mile[1]
PER CAPITA INCOME: $1,398[2]

This is the southern portion of the Cumberland Plateau in Kentucky. One of the most rural regions, it also has the lowest population density and the lowest per capita income. Many of this region's counties contain important coal deposits.

Bluegrass Unit

36 Counties
LAND AREA: 5,641,800 acres
COMMERCIAL FOREST LAND: 24 percent
POPULATION: 1,551,778[1]
RURAL POPULATION: 25 percent[1]
POPULATION DENSITY: 176 per square mile[1]
PER CAPITA INCOME: $3,043[2]

This region is named for the well-known grass that occurs naturally in the area. Its botanical name (*Poa pratensis* L.) means literally "grass of the meadows". This is, indeed, a region of grassy meadows. Because of the area's generally fertile soils and gentle rolling terrain, most of the original forest has long since been cleared for agriculture. Tobacco and thoroughbred horses are synonymous with the Bluegrass region. This is the most affluent and densely populated unit in the State, and the least forested.

Pennyroyal Unit

20 Counties
LAND AREA: 4,780,700 acres
COMMERCIAL FOREST LAND: 45 percent
POPULATION: 363,163[1]
RURAL POPULATION: 71 percent[1]
POPULATION DENSITY: 49 per square mile[1]
PER CAPITA INCOME: $1,926[2]

This unit is named for the Pennyroyal of America (*Hedeoma pulegioides*), a wild member of the mint family that grows abundantly in this region. This area is well drained and it has depressions and caverns where the underlying limestone deposits have been dissolved. Relatively drier soils and hilly terrain make this region unsuitable for highly productive agriculture.

Western Coalfield Unit

20 Counties
LAND AREA: 5,478,500 acres
COMMERCIAL FOREST LAND: 34 percent
POPULATION: 490,626[1]
RURAL POPULATION: 55 percent[1]
POPULATION DENSITY: 57 per square mile[1]
PER CAPITA INCOME: $2,225[2]

This area encompasses the western coalfields of Kentucky. The region also contains petroleum and other mineral deposits. Farming is extensive in this region as the soils are generally fertile, and the terrain is more gentle than most regions to the east.

Western Unit

11 Counties
LAND AREA: 2,190,800 acres
COMMERCIAL FOREST LAND: 32 percent
POPULATION: 189,148[1]
RURAL POPULATION: 63 percent[1]
POPULATION DENSITY: 55 per square mile[1]
PER CAPITA INCOME: $2,401[2]

This is a gently rolling agricultural region. In the far western portion of the unit are rich bottomlands along the Mississippi River.

Comparisons between inventories

Through the years, many definitions, procedures, and methods have changed because of improved forest-inventory and data-processing techniques. This means that to analyze actual trends between forest surveys, the estimates from the previous survey must be on a comparable basis with the current survey. This procedure pinpoints the sources of inconsistency in the data that may be the result of differences in procedures or definitions between inventories. In the case of Kentucky, it was found that the average tree volume by 2-inch diameter classes was the major area of discrepancy between the 1963 and 1975 inventories. The volume table used in 1963 was more conservative than all others tested. When the 1963 stand-table data were used with average tree volumes from the 1975 inventory, the adjusted 1963

estimates of volume were consistent with the estimates of growth and removals during the 1963-1975 period. The following adjusted estimates of 1963 growing stock and sawtimber are used throughout this report for comparison purposes:

CHANGE IN AREA AND VOLUME 1949-75

	1949	*1963*	*1975*	*Change 1963-75*
Commercial forest land: (*thousand acres*)	11,446.0	11,712.8	11,901.9	+189.1
Growing-stock volume: (*million cubic feet*)				
Softwoods	457.1	613.0	862.5	+249.5
Hardwoods	7,279.2	8,673.4	10,581.2	+1,907.8
Total	7,736.3	9,286.4	11,443.7	+2,157.3
Sawtimber volume: (*million board feet*)				
Softwoods	1,077	1,413	1,967	+554
Hardwoods	17,315	20,841	25,585	+4,744
Total	18,392	22,254	27,552	+5,298

HISTORICAL BACKGROUND

Kentucky, the "dark and bloody ground" of centuries of internecine wars among Choctaw, Shawnee, and Cherokee, was once nearly all a dense forest. It is believed that of the 26 million acres of land in Kentucky more than 24 million were densely forested, often with legendary giants (Collins 1975).

Early accounts by Thomas Chrittenden Cherry stated that "the giant forests of oak and tulip, beech and ash, sycamore and linden (basswood), cedar and pine, and many other varieties of trees grow so close that their leafy branches spread a canopy through which the rays of the sun could scarcely penetrate, producing twilight effects even at high noon" (Collins 1975).

By the 1760's, the first white men were crossing the Appalachians to settle in Kentucky. Most moved west of the mountains into the more gently rolling Bluegrass and Pennyroyal regions. These were the legendary frontiersmen and adventurers. Later the mountains would be settled by others, equally colorful but less schooled in the ways of woodland life. These were the orphans, debtors, social outcasts, even criminals, who had been brought from the overcrowded, pestilence-ridden cities and larger towns of Britain as indentured labor for the plantations of Virginia and the Carolinas (Caudill 1962). Having worked their term of identure but still penniless, these settlers moved into the hills and hollows of the Appalachians. Here they could have land for the taking and need not live in the shadow of an affluent landed gentry.

To the early settlers of Kentucky, these dense forests were an obstacle and a hindrance. Land had to be cleared for homesteads and farms. Timber was sometimes burned to provide potash for fertilizer; more often it was burned to get rid of it. Many settlers had little knowledge of even basic farming techniques. They made mistakes. They built their cabins on the flatlands near streams, often the most suitable land for farming. They cleared the hillsides for fields and turned their livestock loose in the woods. The result was erosion, declining crop yields, and subsistence farming.

For years the mountaineer had seen the timber around him as a source of heat, housing, and a little income. After the Civil War, the timber in the Kentucky hills caught the eye of northern and eastern speculators. Corporations were organized to purchase and speculate in east Kentucky timber. Some of the corporations sent lawyers into the hill counties, where they found vague or non-

existent land titles. Often by merely filing a legal deed or claim, these corporations were able to acquire land from under the feet of the mountaineers (Caudill 1962).

Logging boomed in the hills. By 1870 Kentucky produced 217 million board feet of timber. The State ranked fifteenth in total production but near the top in hardwood production. By 1907, total production peaked at 913 million board feet, and the industry employed an estimated 30,000 people (Widner 1968). During this era large trees were often felled for only one log. The remainder of the tree was left to rot or burn, and little if any thought was given to the land or the next crop. Wildfire and erosion ravaged the land. By 1925 the boom became a bust—only 10,000 people were employed in a lumber industry that produced only 207 million board feet (Widner 1968).

The development of the coal industry was now well along, and again the hill folk were bamboozled. Few had any idea of the value of the coal seams that ran through the hills. For what seemed to them a large sum they signed the "broad-form deed" that gave to others not only the coal, oil, gas, and all mineral and metallic substances and "all combinations of the same," but also the right to build roads, cut timber, and do whatever else was "convenient and necessary" to extract the minerals (Caudill 1962). Without realizing what he had done, the mountaineer had given the coal interests a free hand to get at the mineral wealth of the hills.

Today, the forests of Kentucky, still beautiful but less majestic and often scarred, are slowly recovering from this double-barreled assault.

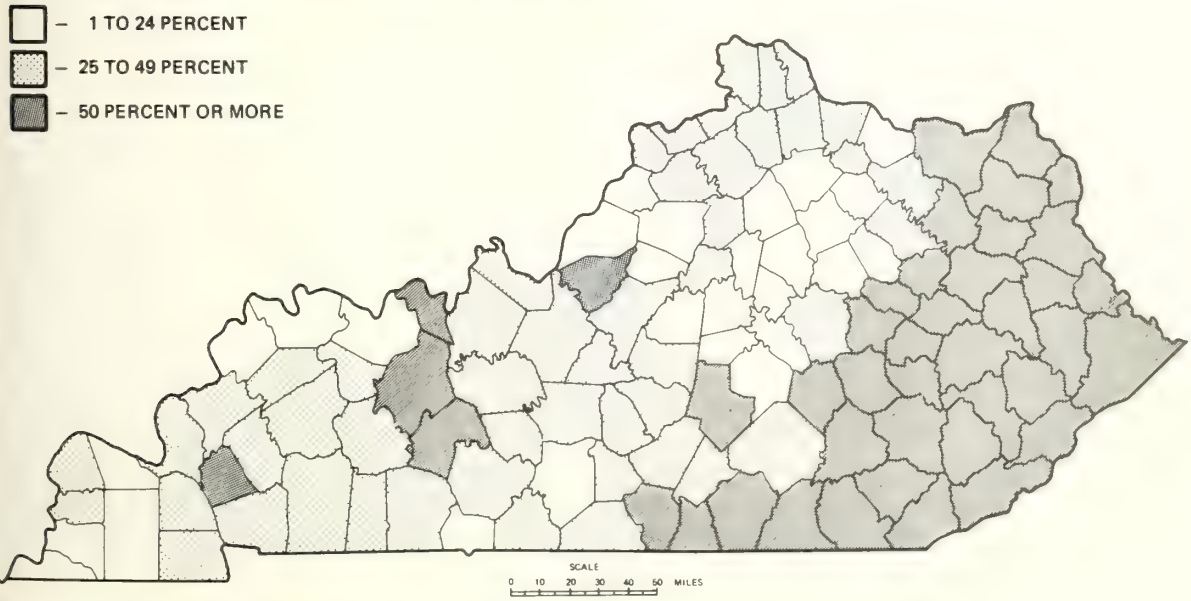
FOREST AREA

Forests now cover almost 48 percent of the land area of Kentucky—a total of 12,160,800 acres. Of this, 11,901,900 acres or 47 percent of the land area is classed as commercial forest land. This is land that is producing or is capable of producing crops of wood, and is not withdrawn from timber utilization by statute or administrative order.

Total forest area has increased by 3 percent since the last survey in 1963, and by 6 percent since the first survey in 1949. The area of commercial forest land has not increased as much, only by 2 percent since 1963 and by 4 percent since 1949. Productive reserved forest land increased by 164 percent. In 1963, only 80,700 acres were in this category, in 1975, there were 212,800 acres. Most of this increase is the result of thousands of acres of reservoirs that have been built since the last survey, especially in the Pennyroyal Unit.

Commercial forest land is not distributed evenly throughout the State. The percentage of commercial forest land ranges from a low of 5 percent in both Bourbon and Fayette Counties to a high of 94 percent in Leslie County. The most heavily for-

Figure 2.—Percentage of commercial forest land, by county, Kentucky, 1975.



ested part of Kentucky is in the eastern three geographic units which include part of the rugged Appalachians and all of the Daniel Boone National Forest. The average amount of commercial forest land for this section is 79 percent. The average for the rest of the State is only 33 percent. Figure 2 shows the general distribution of commercial forest land.

While the change in commercial forest-land acreage amounted to a relatively small 2-percent increase statewide, there was a dramatic 18-percent increase in the Bluegrass Unit between inventories. This large change resulted primarily from the abandonment of marginal farmland. Most of this "new" commercial forest land is in seedling- and sapling-size stands.

The Eastern Unit also showed a sizeable increase in commercial forest-land acreage—5 percent since 1963. This change also is attributed to abandonment of small marginal farms in the mountainous section of Kentucky. All of the other units showed increases or decreases of about 2 percent or less.

Forest-land ownership

Private ownership accounts for 92 percent of the commercial forest land in Kentucky. Only 895,300 acres are publicly owned. Of this, 818,700 are in Federal ownership. The Daniel Boone National Forest accounts for 588,800 acres and other Federal agencies hold 229,900.

The 11 million acres that are not publicly owned are in the hands of an estimated 455,600 private owners—including 427,200 individuals; 16,300 undivided estates; 8,400 partnerships; 2,600 corporations, and 1,100 clubs, youth organizations, churches, and similar associations. The average size of a privately owned tract of commercial forest land is only 24.2 acres, but these tracts range in size from 1 acre to as much as 100,000 acres. While 57 percent of private owners hold fewer than 10 acres of forest land, they account for only 7 percent—805,900 acres—of the total commercial forest-land base.

Of the 427,200 individuals who own commercial forest land in Kentucky, 107,600—25 percent— are farmers. Besides being the largest group of individual owners, they hold the most commercial forest acreage—3,141,100—35 percent—of any one group of people. Retired individuals are the next largest group, numbering 100,200—23 percent—and holding 1,952,900 acres of commercial forest land.

Of the 2,600 corporate owners, 1,000 are in industries not oriented toward forest production, such as coal and steel. These companies account for 602,900 acres of commercial forest land, which is 59 percent of all corporate holdings. Nonproduction, service-oriented companies number 900 or 35 percent of all corporate owners, but these companies hold only 102,700 acres or 10 percent of the corporate forest land. There are only 100 forest-industry corporations in Kentucky that own forest land, but they account for 107,900 acres of commercial forest land.

These estimates of numbers of owners and the amount of commercial forest land they own are based on the responses to a questionnaire that was sent to a random sample of forest owners in Kentucky. The results of this study will be published separately.

One of the primary objectives of this study was to estimate the volume of timber on privately owned commercial forest land that is now or may be available for timber harvesting. Thirty percent of the private forest-land owners in Kentucky have harvested timber from their land. While this may seem to be a fairly small number, it is important to note that these owners control 54 percent of the privately owned commercial forest land. Most of the owners of unharvested land have not harvested their timber because it is immature or of poor quality. Few owners reported that they have not harvested because they are opposed to harvesting.

Only 3 percent of the woodland owners cited timber production as their primary reason for owning forest land. These individuals control 940,000 acres or 9 percent of the forest land owned by the private sector. Not surprisingly, the reasons given most often for owning forest land were farm related—that is, the woods were part of the farm and served no useful function in the farm operation, or were sources of forest products for farm use, such as fenceposts, firewood, or rough lumber.

One of the more interesting facts determined in this ownership study is the tremendous number of people or corporations owning relatively small tracts of woodland. Eighty-eight percent—401,300 nonpublic owners—own fewer than 50 acres of woodland. This fact alone would create many problems for timber management, however only 35 percent—or 3,955,900 acres—of the

commercial forest land in Kentucky is held by these small-woodland owners. Thus the economic benefits derived from managing larger tracts can still be realized in many situations.

Forest types

Forest type classifications and definitions used in this survey differ in several respects from those used in the surveys of 1949 and 1963. Because of these differences, we are unable to compare acreages of the forest types between surveys. Our discussion, therefore, will be based on data collected from this most recent survey.

Twenty-five forest types were recognized in this resurvey. These were assigned to seven major type groups that are recognized nationally by Resources Evaluation (see Table 10 in the appendix). Some groups are made up of only a small number of types in Kentucky. For example, the only type in the white and red pine group in Kentucky is hemlock. Other groups are made up of several types. The oak/hickory group is a good example; it is composed of eight types. Figure 3 gives a breakdown of the commercial forest-land area by the major forest type groups.

Oak/hickory. The oak/hickory group dominates every section of the State. A total of 7.5 million acres—63 percent—of commercial forest land is occupied by this group. Two forest types—white oak/red oak/hickory and mixed hardwoods—predominate, each containing about 2 million acres. Either type alone has more acreage than any one of the six other major groups. In fact, the combined acreage of these two types—4,006,900—approaches the combined acreage of the six other major groups—4,413,400.

Maple/beech/birch. This valuable northern

Oak-hickory stands dominate Kentucky's forests.

Kentucky Division of Forestry Photo.

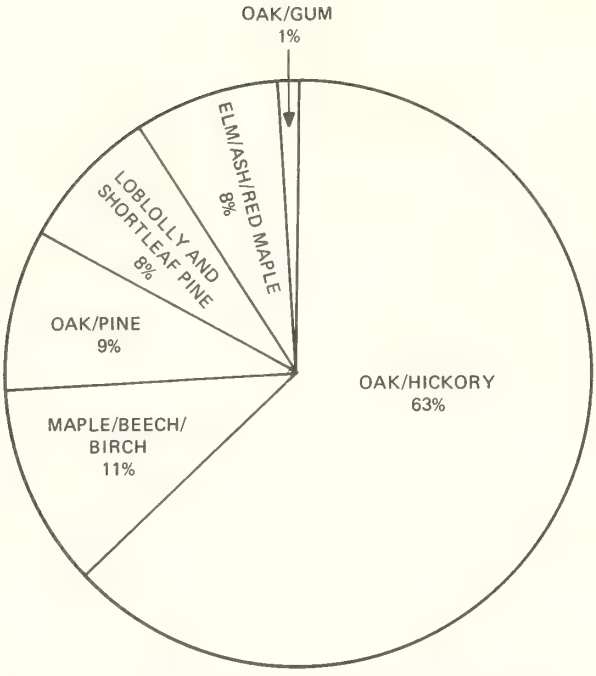


Figure 3.—Percentage of commercial forest-land area, by major forest type group, Kentucky, 1975. (White and red pine type group amounts to less than 1 percent.)

hardwood group is also found in all parts of the State, but is concentrated in eastern Kentucky. This group accounts for 11 percent of the commercial forest land. Its 1,354,200 acres can be broken down into three types: sugar maple/beech/yellow birch with 1,316,600 acres, black cherry with 23,000 acres, and black walnut with 14,600 acres. These last two types were distinguished because of their particularly high value to the sawtimber industry.

Oak/pine. This group, covering 1,040,600 acres of the commercial forest land of Kentucky—9 percent—occurs throughout the State but is found mainly in the east-central region. A substantial component of this group is the eastern redcedar/hardwood type—470,500 acres. Other types in this group are Virginia pine/southern red oak with 282,200 acres, shortleaf pine/oak with 183,300 acres, and other oak/pine with 104,600 acres.

Loblolly and shortleaf pine. This group in Kentucky contains no loblolly pine, but its 942,800 acres can be broken down into four other softwood types: eastern redcedar with 428,100 acres, Virginia pine with 299,200 acres, shortleaf pine with 167,700 acres, and pitch pine with 47,800 acres. These softwood types are an esthetic bonus in many areas during the dormant season; they add welcome color to an otherwise dreary landscape.

Elm/ash/red maple. This group, covering 936,000 acres—8 percent—of the commercial forest land, is dominated by red maple, as evidenced by the 789,300 acres in the black ash/American elm/red maple type. The two other types are river birch/sycamore with 113,100 acres, and willow with 33,600. These two types are bottomland hardwood types commonly found along rivers and streams; they are generally of little commercial value.

Oak/gum. With the exception of a little acreage in the Eastern Unit, most of the 101,600 acres in this group are found in the western three units. The type is made up of two types in Kentucky—sweetbay/swamp tupelo/red maple and swamp chestnut oak/cherrybark oak. These types are common to the moister sites of the southern United States.

White and red pine. All of the 38,200 acres of this group are in the hemlock type, and are limited to the eastern three units. This type is scattered and is usually found in cool locations, moist ravines, and north-facing slopes.

Stand-size classes

The breakdown of commercial forest-land acreage by the size of the timber, or stand size, has changed little since the last survey. Currently, the State has 5.5 million acres in sawtimber stands, 3 million acres in poletimber stands, and 3.4 million acres in seedling-and-sapling stands, including 46,200 acres in nonstocked areas. This means that 47 percent of the commercial forest land is in sawtimber stands, 25 percent in poletimber stands, and 28 percent in seedling-and-sapling stands. These proportions are nearly the same as in 1963, indicating a stable timber-resource base in the State.

When the stand-size data are analyzed by major forest type group, there are some significant differences. Of the acreage in the loblolly and shortleaf pine group, 30 percent is in sawtimber stands, 17 percent is in poletimber stands, and 53 percent is in seedling-and-sapling stands. The high percentage for seedling-and-sapling stands is probably due to colonization of abandoned farmland

by eastern redcedar and Virginia pine, two common pioneer species in this region.

Another group with a higher percentage of its acreage in seedling-and-sapling stands is elm/ash/red maple. This is because red maple is very abundant at the seedling-and-sapling stage of its life cycle. As it ages, other species crowd out the maple, and through succession, the stand, as it grows to poletimber or small-sawtimber size, becomes another forest type.

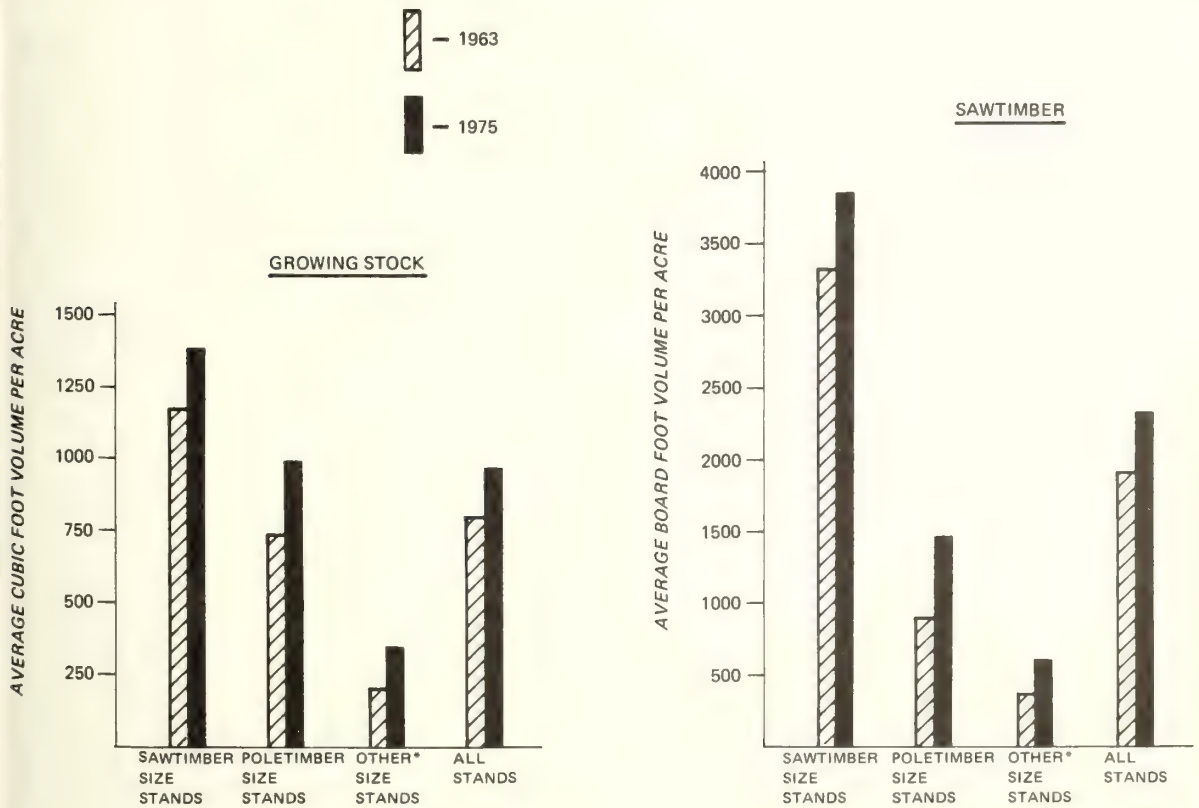
The oak/pine group also has a preponderance of seedling-and-sapling stands—47 percent. As with the loblolly and shortleaf pine group, this is attributed to invasion by intolerant softwood and hardwood species of abandoned farmland. Eastern redcedar again plays a major role in the heavy proportion of young stands in this group.

The situation in the maple/beech/birch group is quite different. Here 68 percent of the acreage is in sawtimber stands, with only 16 percent in poletimber stands, and 16 percent in seedling-and- sapling stands. This proportion reflects the fact that sugar maple and beech are very shade tolerant species and tend to dominate a stand in the later stages of succession.

TIMBER VOLUME

Though the area of commercial forest land in Kentucky increased by only 2 percent from 1963 to 1975, the volume of growing stock increased by 23 percent. This increase is due to several factors. One is that growth has exceeded removals by a wide margin between inventories. Another reason is that with a relatively limited market for timber less than sawlog size in the heavily forested sections of the State, stands generally are allowed to reach sawtimber size before any cutting is done. Thus stands that were in the seedling-and-sapling stage in 1963 are now pole-size stands. This ingrowth has increased the standing volume of the woodlands in Kentucky substantially. Also, many

Figure 4.—Average volume per acre for growing stock and sawtimber, by timber size class, for 1963 and 1975, Kentucky.



*OTHER SIZE STANDS IS A COMBINATION OF SEEDLING, SAPLING, AND NONSTOCKED STANDS

of the pole-size trees measured for the 1975 inventory are still in the pole size class (5.0 to 10.9 inches in diameter at breast height (dbh) for hardwoods), or are in the small sawtimber class and have not been harvested.

Since volume has increased much more than commercial forest area, volume per acre has also increased. In 1963, the average acre of commercial forest land had 793 cubic feet of growing stock or 1,900 board feet of sawtimber. By 1975, the averages had risen to 962 cubic feet and 2,315 board feet, increases of 21 and 22 percent, respectively. Figure 4 shows how these figures for average volume per acre have changed by various timber size classes.

The total net volume of growing-stock trees in Kentucky is 11.4 billion cubic feet, compared to 9.3 billion in 1963. More than 92 percent of this volume is in hardwood species. There are only 863 million cubic feet of softwoods, and 75 percent of this volume is found in the eastern three units. In addition, there are about 1.2 billion cubic feet of merchantable volume that can be recovered from rough or rotten cull trees. There are 743 million net cubic feet in rough trees too crooked or misshapen to be considered growing stock. There are also 428 million cubic feet of sound wood in trees that contain too much rot to be classed as growing stock. In Kentucky, about 16 percent of trees larger than 5.0 inches in dbh are rough or rotten. In the past, harvesting sound volume in cull trees has been uneconomic. But whole-tree harvesting equipment and other improvements in logging and wood utilization have made it possible for more and more of this merchantable volume in heretofore unmerchantable trees to find its way out of the woods and into forest products.

Sawtimber volume has increased by 24 percent since 1963. The volume in 1975 was 27.6 billion board feet. It has been estimated that in the mid-1700's, when Kentucky was more than 93 percent forested, the total volume of the State probably exceeded 250 billion board feet (Collins 1975). These figures, once again, show us the tremendous impact that man has had on the forest resources of Kentucky.

Sawlog quality

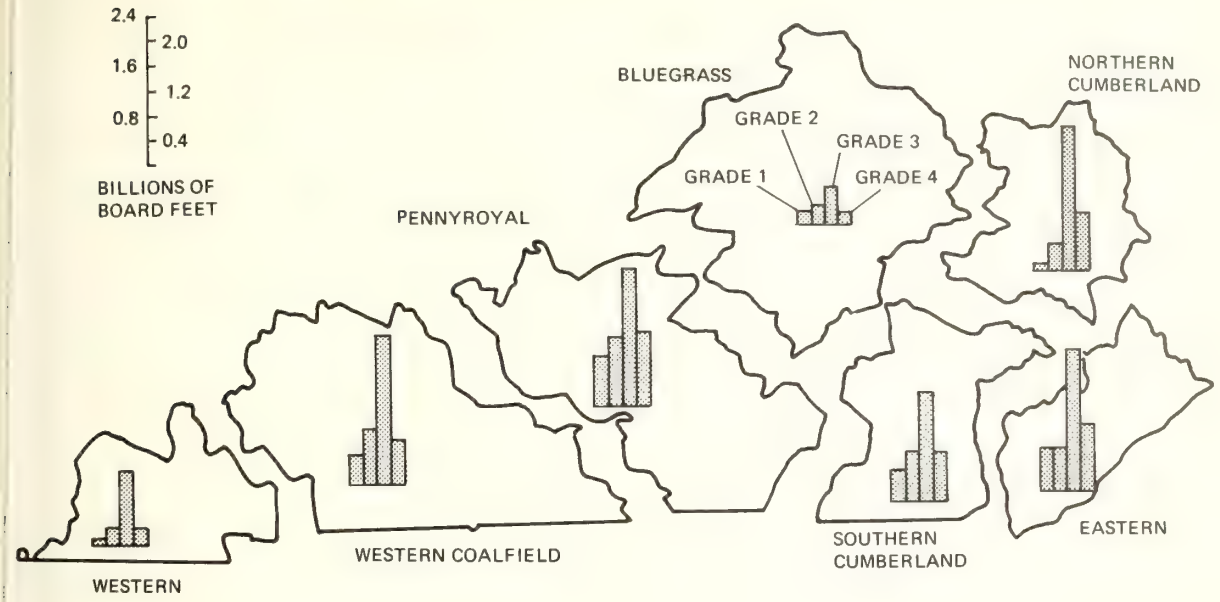
Sawlog quality is very important because the difference in value between high- and low-quality logs can amount to several hundred dollars for equal volumes of the same species. So when the timber resource of a state is surveyed, log grades are assigned to all sawtimber-size trees on the basis of dbh, percent cull, and surface defects. Since nearly all of the sawtimber volume of Kentucky is in hardwood species, this discussion will center on hardwood log grades.

We use four log grades, the first three of which are factory grades; the fourth is a construction grade. Factory grade logs are suitable to be sawn into graded lumber. Grade-1 logs generally yield at least 70 percent No. 1 common boards or better; grade-2 logs yield at least 50 percent, and grade-3 logs yield at least 25 percent. Some grade-1 material is suitable for veneer, but most of it is used in furniture. Grade-2 logs may be used in furniture, and dimension and flooring, and some volume is used in lower quality products such as pallets. Grade-3 logs are used in products such as dimension and flooring, pallets, and upholstered furniture. Grade-4 logs (construction or tie and timber logs) are suitable for products requiring strength of piece, such as ties and heavy timbers. Other products derived from these logs include structural wood joists, planks, beams, stringers, and posts. Logs that do not meet the specifications of these four grades are considered cull logs.

Kentucky now has 7.5 billion board feet of hardwood sawtimber volume in grades 1 and 2. This amounts to 30 percent of the hardwood volume, which is a drop from the 1963 inventory. The decrease may be due to "high-grade" logging practices, where the better material is cut and the lower quality material is left. The hardwood volume in grade 3 is 12.8 billion board feet, which makes up 50 percent of the total hardwood volume. This is by far the most common log grade in Kentucky. Tie and timber logs are a distant second with 5.2 billion board feet, or 20 percent of the hardwood sawtimber volume.

The distribution of quality hardwoods in Kentucky is not uniform (Fig. 5). The Pennyroyal Unit has the best quality hardwood stands. This unit contains 20 percent of the hardwood sawtimber volume but 27 percent of all grade-1 volume and 23 percent of all grade-2 volume in the State. Within the unit itself, 36 percent of the hardwood sawtimber volume is grade 1 or 2. The Northern Cumberland Unit has the lowest proportion of high-quality hardwoods, containing 15 percent of the hardwood volume but only 4 percent of the grade-1 volume and 10 percent of the grade-2 volume. Within the unit, only 15 percent of the

Figure 5.—Hardwood sawtimber volume, by log grade and geographic unit, Kentucky, 1975.



hardwood sawtimber can be classed as grade 1 or 2.

Volume by species

Kentucky is typical of the eastern hardwood forest region; it has many species that vary in site requirements, value, and occurrence. To consider hardwoods as a single group would give an inadequate account of the hardwood timber resource in the State. A breakdown of hardwods into seven species groups provides a better idea of the timber resource. Figures 6 and 7 show how growing-stock and sawtimber volumes of these species groups (and of an eighth group for softwood) have changed over a period of 26 years. Figure 8 gives a breakdown of the growing-stock volume by species group.

White oaks. This group is made up primarily of white oak (54 percent), chestnut oak (33 percent), and post oak (9 percent). White oaks account for 23 percent of the growing stock and 24 percent of the sawtimber volumes. In 1975, the growing-stock volume for the white oak group was 2.6 billion cubic feet—an increase of 525 million cubic feet since 1963. The sawtimber volume of white oaks was 6.6 billion board feet in 1975. Sawtimber volume for white oaks increased by 1.8 billion board feet since 1963—a 39-percent rise. This increase was far greater than that for any other species group.

White oaks dominate the growing stock of all geographic units except in the Eastern Unit, where red oaks are more plentiful. The heaviest concentration of white oaks is in the Pennyroyal and Northern Cumberland Units—42 percent of the growing stock. These units, along with the Western Coalfield, Southern Cumberland, and Eastern Units, account for 88 percent of the growing-stock and sawtimber volumes.

The predominance of white oaks in Kentucky is due to many factors. First, the State is located in the center of the white oak range, on the southern edge of the chestnut oak range, and on the northern edge of the post oak range. Because of this overlap, white oaks are more abundant in Kentucky than they are in most neighboring states. Second, since white oak is the most prominent oak of the eastern deciduous forest, and since Kentucky is in the heart of this forest, white oak achieves its maximum development here. White oak, within the oak-hickory forest type, can be found on nearly all sites—from ridges to lower slopes. It is a very adaptable species and grows well under a variety of conditions. Chestnut and post oaks are generally found on drier slopes, or areas of greater environmental stress. These two species fill certain niches where white oak may not

Figure 6.—Growing-stock volume, by species group, Kentucky, 1949, 1963, 1975.

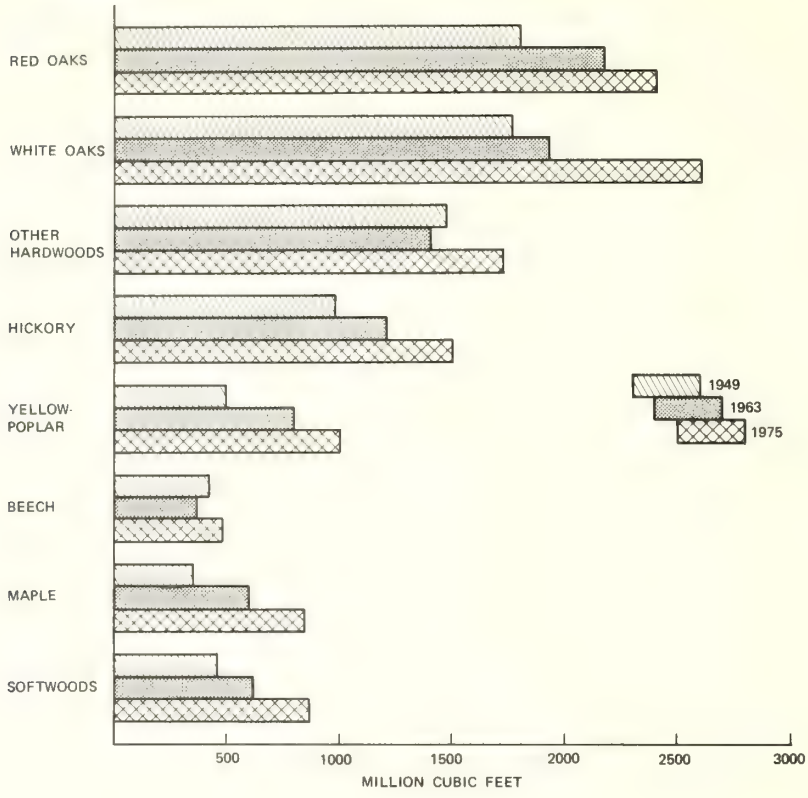


Figure 7.—Sawtimber volume, by species group, Kentucky, 1949, 1963, 1975.

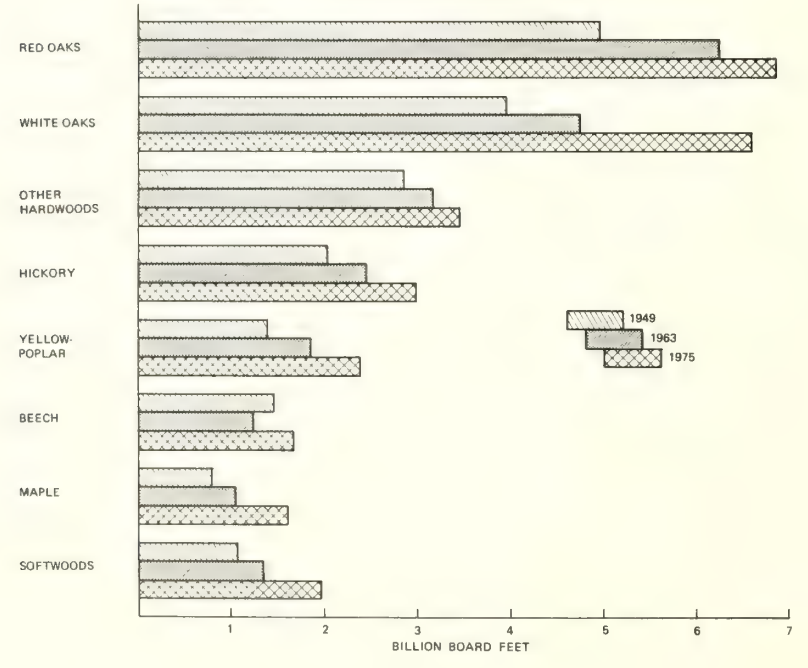
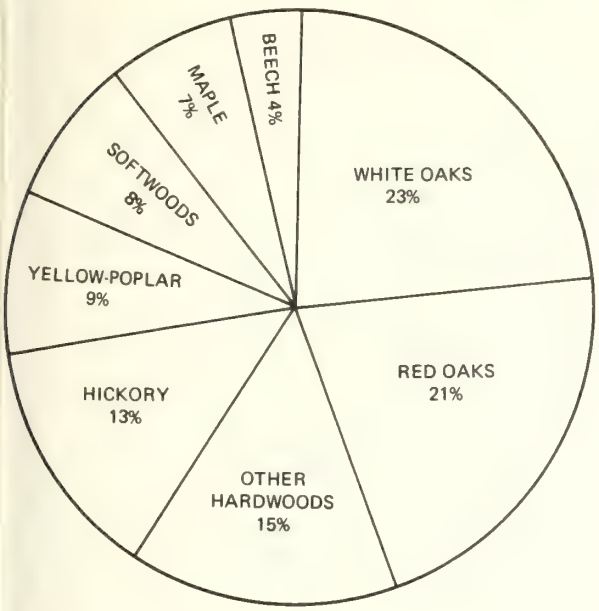


Figure 8.—Percent growing-stock volume, by species group, Kentucky, 1975.



be as competitive. So, because of the climate and location of Kentucky, as well as the diverse habitats occupied by the white oaks, this species group is an important part of the timber resource of the State.

Red oaks. The major species of this group are black oak (43 percent), northern red oak (24 percent), and scarlet oak (22 percent). With a growing-stock volume of 2.4 billion cubic feet, the red oaks rank second to the white oaks. In sawtimber volume, red oaks rank first with 6.9 billion board feet. Since 1963, the growing-stock volume of the red oaks has increased by 9 percent, and sawtimber volume has increased by 11 percent. With one exception—other hardwood sawtimber— these are the smallest increases of all eight species groups.

There are two reasons for these small increases in volume, and they both relate to a relatively high demand for red oaks. The first is that red oaks represent 33 percent of the sawlog production of Kentucky, yet they account for only 25 percent of the sawtimber inventory of the State. So the red oaks are taking on more than their share of the sawlog production, and thus have not been able to increase in volume as much as the other species. The second reason is that red oak has become a popular veneer species; 12 percent of the 1974 veneer production was in red oak (Bones and Lohr 1977).

The red oaks are well distributed over five units in Kentucky: Western Coalfield, Pennyroyal, Northern and Southern Cumberland, and Eastern. These units account for 88 percent of both the growing-stock and sawtimber volumes of the red oaks. In growing stock, the red oaks follow the white oaks in volume in all units except the Eastern Unit. In sawtimber volume, however, the red oaks lead the white oaks in all units except Pennyroyal and Bluegrass. The red oaks and white oaks combined account for nearly one-half of the timber resource of Kentucky.

Other hardwoods. This species group represents all hardwood species excluding oak, hickory, yellow-poplar, maple, and beech. The group includes species such as ash, walnut, black cherry, basswood, sweetgum, blackgum, and elm. None of the species in this group has enough volume to consider separately, but together they account for 1.7 billion cubic feet or 15 percent of the growing-stock volume, and 3.4 billion board feet or 12 percent of the sawtimber volume.

The volume of growing-stock increased by 17 percent from 1949 to 1975, and by 25 percent from 1963 to 1975. As shown in Figure 6, there was a slight decline in the growing stock inventory of this group in 1963, Figure 7 shows the small but steady increase in sawtimber volume since 1949. The dip in growing stock in 1963 indicates that many pole-size trees were removed from the stands while the sawtimber-size trees continued to grow faster than they were removed from the inventory. From 1963 to 1975, other species in this group asserted themselves, and this, combined with a decline in demand for products derived from this species group, explains the current upswing in both the growing-stock and sawtimber inventories.

The distribution of this species group, because of its unusual composition, is unlike that of the other seven groups. The Western Coalfield and Pennyroyal Units are the leaders with a combined 44 percent of both the growing-stock and sawtimber volume. Four other units each have about 12 percent of both growing stock and sawtimber: Western, Bluegrass, Southern Cumberland, and Eastern. The Northern Cumberland Unit has only 8 percent of the growing-stock volume and 6 percent of the sawtimber volume.

Hickory. For volume, the hickories of Kentucky

are the next most important species group. This group contains 1.5 billion cubic feet of growing stock (13 percent), and 3.0 billion board feet of sawtimber (11 percent). The volume of hickory has risen steadily in Kentucky since the first survey, about 50 percent from 1949 to 1975 (Fig. 6).

While hickory is found in all parts of the State, the growing-stock and sawtimber volumes are distributed somewhat differently. For growing stock, most of the volume is found in the Western Coalfield Unit, but the Pennyroyal, Northern and Southern Cumberland, and Eastern Units are close behind. These five units account for 87 percent of this volume. For sawtimber volume, the Western Coalfield and Eastern Units are highest with a combined 43 percent. The Pennyroyal and Southern Cumberland Units account for 33 percent, and the Northern Cumberland, Western, and Bluegrass Units have a combined 24 percent.

Hickory sawlog production in 1974 amounted to only 8 percent of the total (Bones and Lohr 1977). Since hickory accounts for 11 percent of the sawtimber volume, this indicates that not enough hickory is being cut to maintain a stable inventory—so the inventory rises. The hickories are economically important not because they produce large quantities of wood, but because this wood has exceptional characteristics. Hickory is nearly unrivaled for elasticity and strength. Several manufacturing plants in Kentucky make wood handles, and hickory is a preferred species for handles of such striking tools as picks and hammers.

Yellow-poplar. After white oak and black oak, yellow-poplar is the single species with the most volume in Kentucky. This species alone accounts for 9 percent of the wood in the State. The growing-stock volume of yellow-poplar is 1.0 billion cubic feet, more than double the amount in 1949. Sawtimber volume stands at 2.4 billion board feet, an increase of 71 percent since 1949.

Yellow-poplar is an attractive timber species because it grows fast, has excellent form, and is unusually resistant to insects and disease. This species accounts for 13 percent of the sawlog production of Kentucky and 12 percent of the veneer production (Bones and Lohr 1977). Though the demand for yellow-poplar is relatively strong, both growing-stock and sawtimber volume have been rising since 1949. The main reason for this, as is true for nearly all species, is that annual net growth has consistently exceeded annual timber removals and annual mortality since 1949.

More than one-half—54-percent of the growing-stock volume of yellow-poplar is in the Eastern and Southern Cumberland Units. It is also commonly found in the Northern Cumberland and Pennyroyal Units, which account for 34 percent of its growing-stock volume. The Western Coalfield, Western, and Bluegrass Units contain only 12 percent. Sawtimber volume is distributed similarly throughout the State. The Appalachian Mountains in eastern Kentucky form the heart of the range of yellow-poplar.

Softwoods. Hard pines (shortleaf, Virginia, and pitch) make up 77 percent of the softwoods in Kentucky. Eastern redcedar accounts for 13 percent, and other softwoods such as eastern white pine and hemlock account for 10 percent. Softwoods account for 8 percent of the growing-stock volume, and 7 percent of the sawtimber volume. There are about 860 million cubic feet of growing stock and about 2 billion board feet of sawtimber. Softwood volume has increased by more than 80 percent since 1949, and by 40 percent since 1963.

Softwoods supplied 19 percent of the pulpwood production, 99 percent of the post production (primarily redcedar) and 100 percent of the pole production in 1974. Overall demand for softwood in Kentucky has increased slowly since 1962, but softwood growth has increased at a greater rate. Much of the abandoned farmland in the Bluegrass and Eastern Units has seeded into softwood species, and this addition to the commercial forestland area has contributed to the increases in softwood volume.

The softwoods are concentrated in eastern Kentucky. The Southern Cumberland Unit dominates the growing-stock and sawtimber volumes with 41 and 46 percent, respectively. The Northern Cumberland Unit has about one-quarter of the softwood volume. Seventy-six percent of the growing stock of hard pine is in these units. Most of the Daniel Boone National Forest is in these two units, so it is not surprising that 17 percent of the softwood growing stock and 21 percent of the softwood sawtimber is on the Forest. The Pennyroyal and Eastern Units account for 24 percent of the softwood growing stock and 21 percent of the softwood sawtimber. The remaining three units contain about 10 percent of the softwood volume of the State. Redcedar is prominent in the Pennyroyal and Bluegrass Units, where 77 percent of its growing stock is located. Redcedar frequently grows in the rocky limestone and dolomite areas

nat are common in this central region of Kenucky.

Maple. Kentucky has only slightly more sugar naple than red maple. These species combined nake up 7 percent of the growing stock in the tate (850 million cubic feet), and 6 percent of the awtimber (1.6 billion board feet). Maple volume ose by nearly 150 percent from 1949 to 1975. Again, this increase can be attributed to a slowed emand and a continued increase in growth. Alnough maple occurs throughout Kentucky, about ne-half of the volume is found in the Western oalfield and Pennyroyal Units. The Eastern Unit anks third in maple volume with about 16 percent.

Beech. Beech accounts for only 4 percent of the rowing-stock volume and 6 percent of the sawmber volume. In 1975, the growing-stock volume as nearly one-half billion cubic feet, an increase f 25 percent since 1963. The sawtimber volume as 1.7 billion board feet—up 33 percent since 963.

The slight increase in beech volume from 1963 o 1975 seems to be due to a drop in demand for eech timber. Sawlog production in 1969 was 35.6 illion board feet (Bones and Lohr 1972); by 974, production had dropped to 27.1 million Bones and Lohr 1977). Most beech goes into lumer and eventually ends up in furniture. Beech also akes excellent fuelwood because of its high nergy value, and railroad ties when treated with reservatives.

olume by forest type groups

Since certain tree species commonly associate vith one another, thus forming plant communiies, it is desirable to consider volume by forest ype group as we did earlier in our discussion of orest area. The growing-stock volume on the ommercial forest land of Kentucky is divided into ix major groups (the seventh, white and red pine, mounts to less than 1 percent) (Fig. 9). The distriution for sawtimber is similar. Not surprisingly, oak/hickory predominates due to the large volmes of oak, hickory, yellow-poplar, and other ssociated species. This group accounts for 7.9 billion cubic feet of a total of 11.4 billion. Maple/beech/birch is a distant second with 1.4 billion ubic feet, and includes volumes of maple (primarily sugar) beech, black cherry, and black walnut. Elm/ash/red maple and oak/gum are generally bottomland groups, and because their acreage

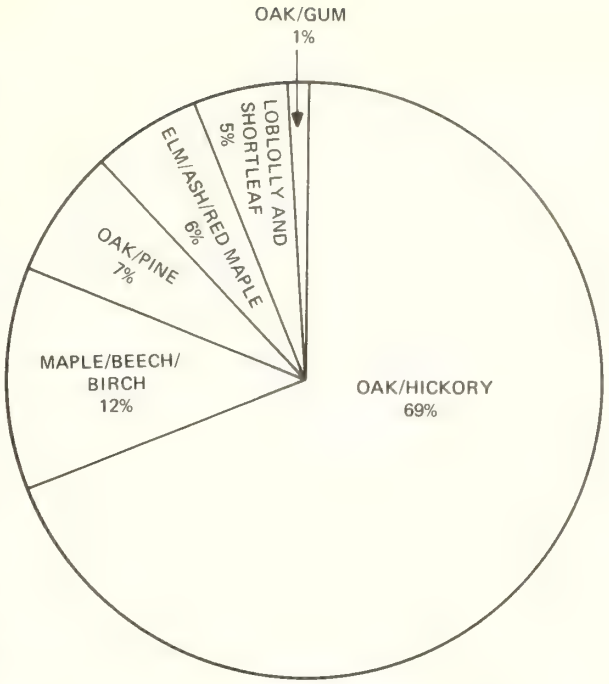


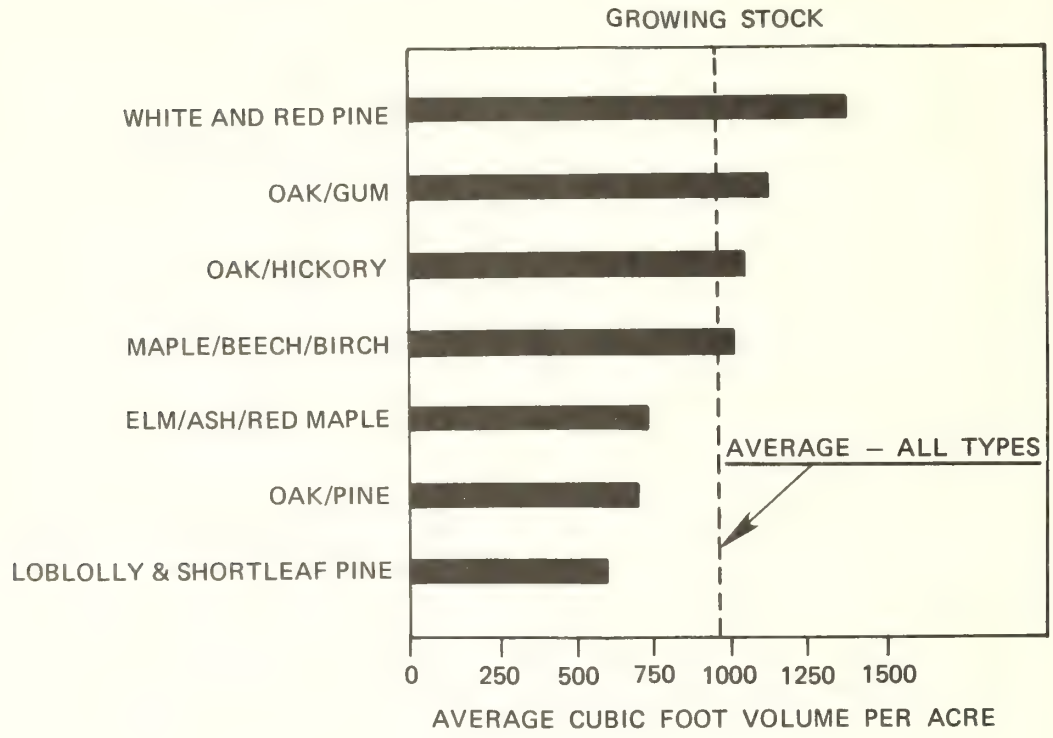
Figure 9.—Percent growing-stock volume, by major forest type group, Kentucky, 1975. (White and red pine type group amounts to less than 1 percent.)

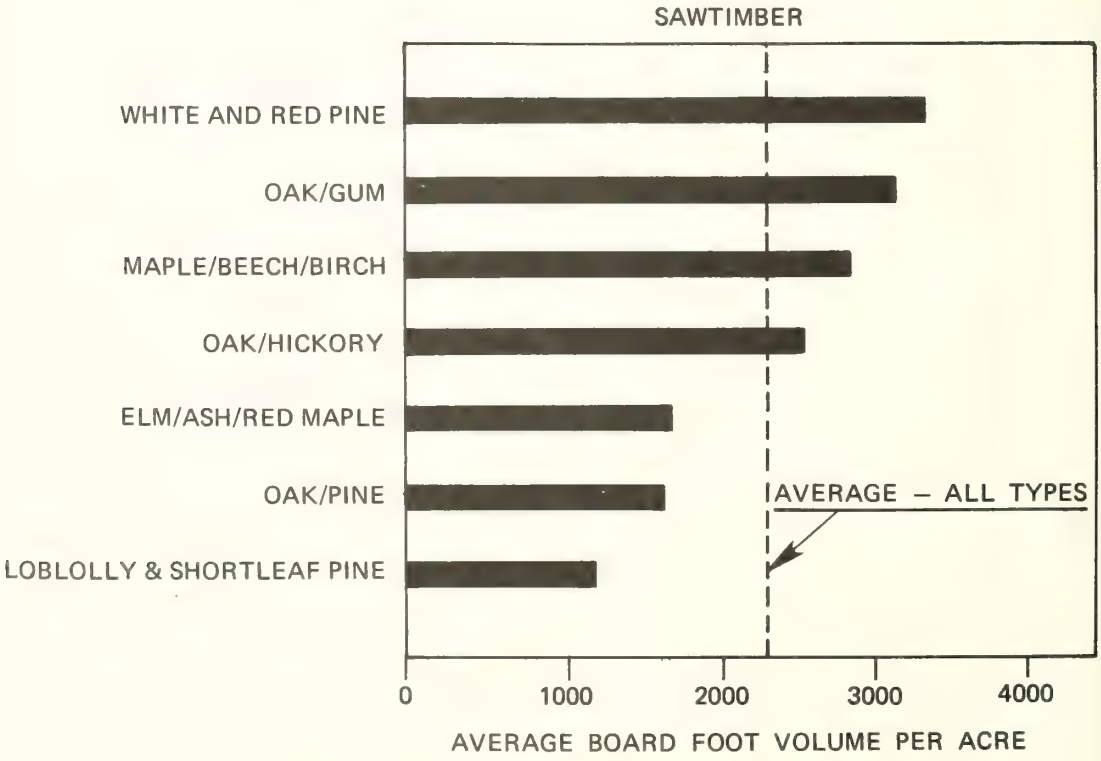
is small they contain only 811 million cubic feet. Oak/pine, with 756 million cubic feet, is influenced largely by oak volume. The loblolly and shortleaf pine group, with 570 million cubic feet, contains nearly one-half of the growing-stock volume of softwood.

Volume per acre

The average volume per acre of commercial forest land also differs from one group to another. Figure 10 shows how the seven groups rank for both growing-stock and sawtimber inventories. The ranking is quite similar in both cases. This can be explained by the distribution of the groups by stand size. The white and red pine group is composed entirely of sawtimber hemlock stands, and thus it has the highest volume per acre. Since the loblolly and shortleaf pine group has 53 percent of its stands in the seedling-and-sapling size, its volume per acre is the lowest. The other five groups have different intermediate proportions of sawtimber, poletimber, and seedling-and-sapling stands, and their rankings can generally be accounted for on this basis.

Figure 10.—Average volume per acre for growing stock and sawtimber, by major forest type group, Kentucky, 1975.





	MILLION CUBIC FEET	PERCENT OF GROSS GROWTH
GROSS GROWTH	410.2	100.0
CULL INCREMENT	–30.5	–7.4
GROWING STOCK MORTALITY	–60.3	–14.7
NET GROWTH	319.4	77.9
REMOVALS	–139.6	–34.0
INVENTORY CHANGE	179.8	43.9

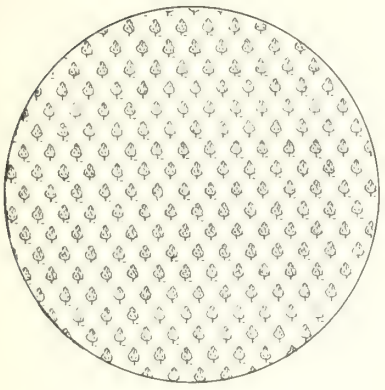


Figure 11.—Components of average annual change in growing-stock inventory, Kentucky, 1962-1974.

GROWTH AND REMOVALS

The substantial increases in inventory were due to various interrelated causes. By 1949, the period of heavy timber cutting had passed. Kentucky was growing more timber than was being harvested, and the forests were well on the road to recovery from the heavy cutting of the first 25 years of the century. However these new forests did not contain the high proportion of valued species—black walnut, butternut, black cherry, and basswood—that the original forests contained. These facts alone would have foretold an increase in the inventory; but from 1949 to the early 1960's, timber harvesting for products declined. In 1949, Kentucky harvested 154.7 million cubic feet of growing stock for products. By 1962, this portion of the harvest had dropped to 104.3 million cubic feet. From 1962 to 1974, the decline had moderated, this portion of the timber harvest stood at 94.3 million cubic feet in 1974.

How the inventory changes

The annual change in the inventory is equal to the net growth less timber removals. Timber removals include the volume of growing-stock removals from the inventory for products and logging residues, as well as volume lost in land clearing or from changes in land use. Net growth is equal to the total volume of growth (gross growth) less cull increment (the volume of sound merchantable material that becomes rough or rotten) and growing-stock mortality (the volume of growing-stock trees that die during the year). It is these components of inventory change that the forester seeks to manipulate when he manages a forest. Figure 11 shows the components of average annual change in the inventory of growing stock for the 1962-74 period. Note that more than 22 percent of the volume grown in an average year is lost to cull increment and growing-stock mortality.

In 1974, total timber removals amounted to

Figure 12.—Annual growth and removals of growing stock, Kentucky, 1974.

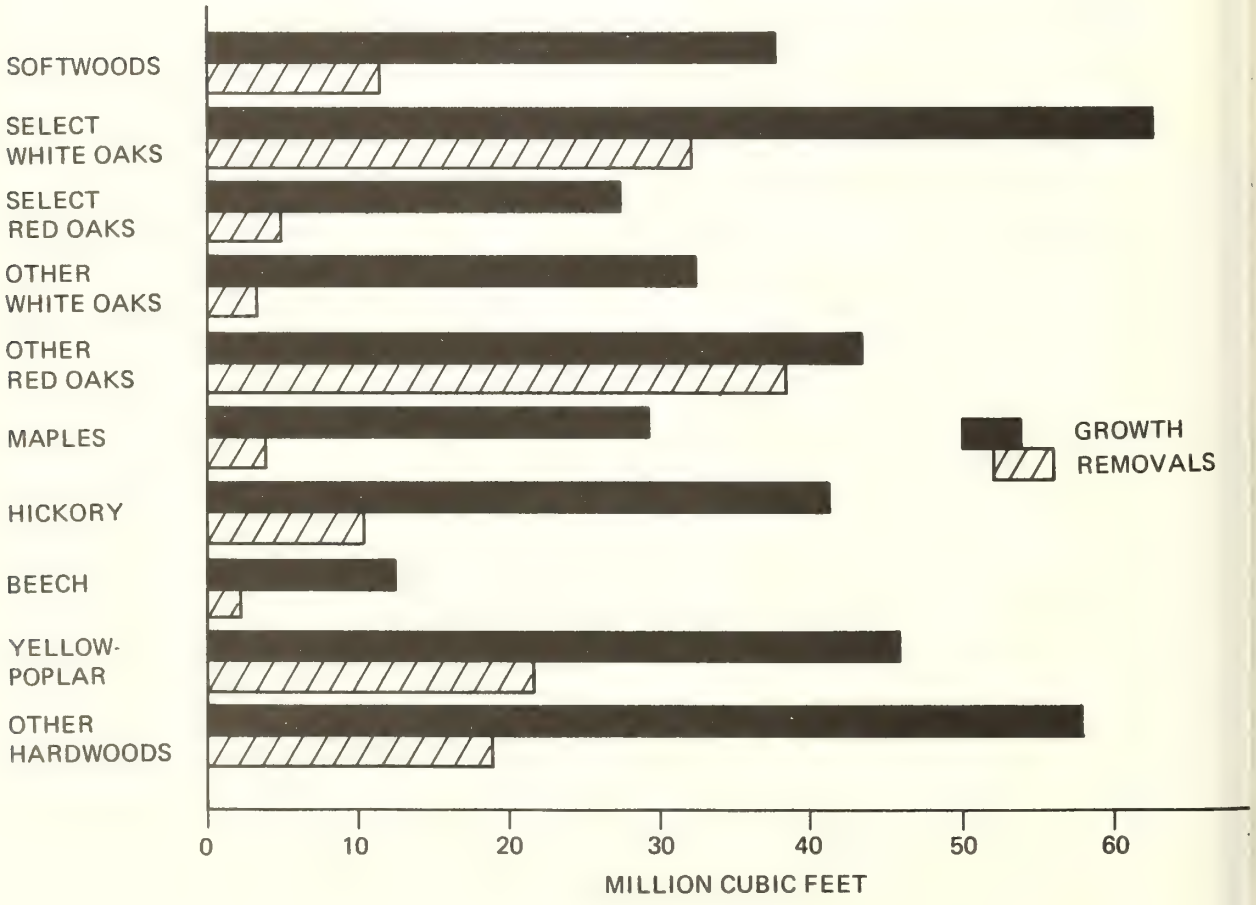
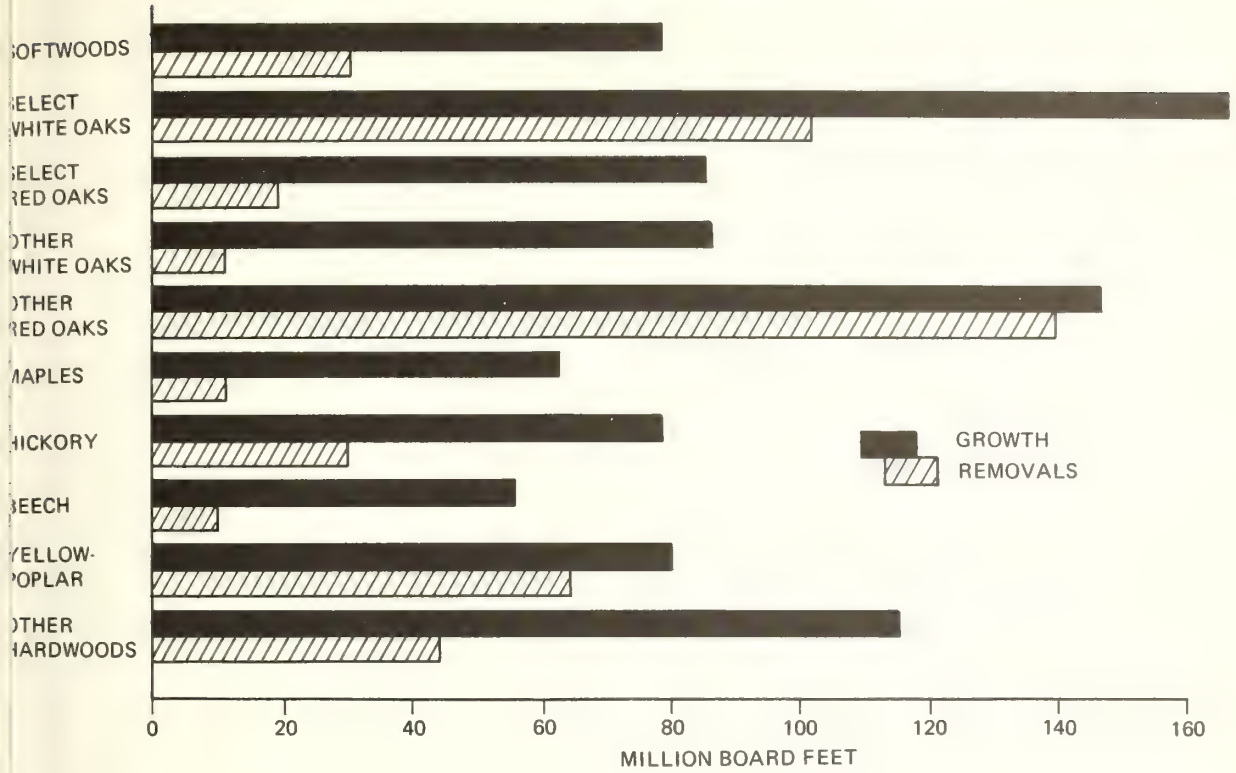


Figure 13.—Annual growth and removals of sawtimber, Kentucky, 1974.



149.6 million cubic feet of growing stock and 528.8 million board feet of sawtimber. On this volume, 94.3 million cubic feet were removed and used for forest products. An additional 25.9 million cubic feet of logging residues were produced. This is growing-stock material that was left in the woods during logging—often material in trees that were inadvertently destroyed during logging, or portions of trees for which no market exists. Trees are often removed from the inventory for reasons other than timber production, land clearing for highway rights-of-way, housing and urban construction, or changes in land use such as from commercial forest land to parks or golf courses. In 1974, 29.4 million cubic feet were removed for such reasons.

The 1974 data are based on the results of a mail canvass of the producers and consumers of Kentucky forest products. The data represent as nearly as possible the amount of timber removed during the year. This raises a question: Was more or less timber removed in 1974 than we would have anticipated, from the recent trend? To answer this we look at trend-level removals (Table 21). Trend level estimates of removals are developed by fitting a curve to the available data from several points in time. Thus the comparison of the actual 1974 removals with the trend-level estimate shows that 1974 removals were essentially at the level we would anticipate on the basis of recent trends. The trend-level estimate for 1974 was 148.9 million cubic feet, while actual reported removals for the same year were 149.6 million. Users of these data should keep in mind that Tables 21, 22, and 23 are trend-level estimates, and that Tables 25 through 28 are based on data from a canvass of primary wood processors.

Species removals

No timber species in Kentucky is being overcut. The species group closest to being overcut is the other red oaks. In this group, 89 percent of the annual net growth of growing stock was removed, and more than 95 percent of the sawtimber growth was removed. Three species groups that have a generally low demand in Kentucky—maples, hickory, and beech—reflect low ratios of removals to growth. So these species are increasing the inventory at the expense of more valued species. Figures 12 and 13 show the relationship of growth and removals for both growing stock and sawtimber by the major species groups in Kentucky.

TIMBER-PRODUCTS OUTPUT

The estimates of timber-product output in Tables 25 through 28 should not be confused with the estimates of annual timber removals in Tables 20, 21, and 22. Timber-product output is that portion of the total timber harvested that was used for products. In addition to timber removed for products, timber removals include logging residues and other removals such as those due to land clearing and changes in land use.

Lumber and sawlogs

Sawmills were undoubtedly among the first manufacturng establishments in Kentucky. These were first pit or whipsaw mills and later water-powered mills. Most of their production was for local use. By 1830, however, the steam-powered sawmill was coming on the scene. This development helped increase lumber production greatly, and the production of lumber for sale on the open market became commonplace. About this time, white oak was in demand in France for wine casks. From this beginning, Kentucky soon developed its prominence in the hardwood lumber industry.

From 1869 through 1946, Kentucky consistently ranked among the top 10 hardwood lumber-producing states. And, during the 10-year period from 1905 through 1914, the State never dropped below fifth place. It was during this latter period that lumber production in Kentucky reached its peak. In 1907, the 1,451 sawmills then operating produced 913 million board feet of lumber (Fig. 14).

In 1974, sawlog production, the raw material for lumber, totaled 489 million board feet. This production is up slightly from the 460 million board feet produced in 1962. However it is only slightly more than half the peak production of 1907. Not only has production dropped to nearly half the peak production but the mixture of species harvested for sawlogs has also changed. Yellow-poplar, which accounted for 23 percent of the sawlog harvest in 1907, accounted for only 13 percent in 1974. Yellow-poplar is a versatile "soft" hardwood species that has always been in demand.

Twenty-three percent of the 1974 harvest of sawlogs was "other" hardwoods. These include all hardwood species found in Kentucky other than yellow-poplar, white and red oaks, and hick-

Sawlog production ranks first in Kentucky . . .

Kentucky Division of Forestry Photo.

. . . but pulpwood production is expandir rapidly

Kentucky Division of Forestry Photo

Figure 14.—Lumber production in Kentucky, 1870-1972.

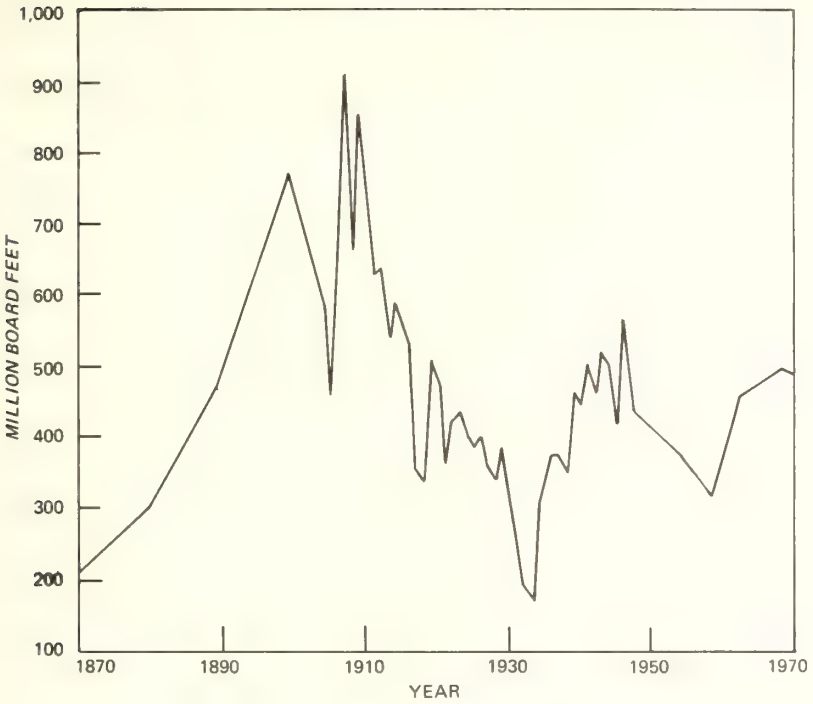
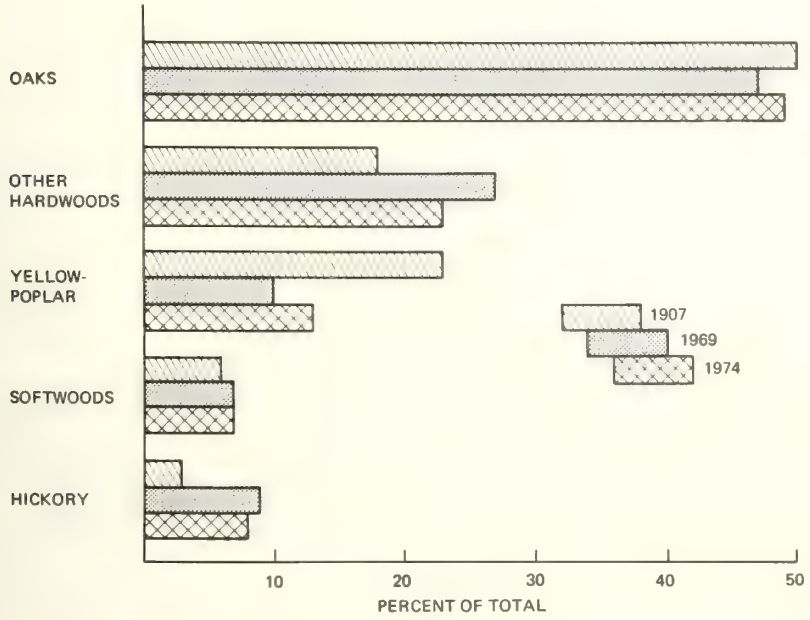


Figure 15.—Percent change in sawlog production, by major species, Kentucky, 1907-1974.



ories. In 1907, only 18 percent of the harvest was "other" hardwoods, 5 percent of which was American chestnut, a species that, because of the blight, no longer exists in sawlog sizes. Thus the harvest of the boom years was more demanding on particular species than is today's harvest. Figure 15 shows the changes in sawlog production by major species in Kentucky.

The number of sawmills in Kentucky has been declining. In 1907 there were 1,451 mills; by 1974, there were only 388 (Fig. 16). However the modern sawmill produces much more than those of the boom period. On the average, the modern sawmill produces twice as much as the 1907 mill—1,260,000 board feet per year versus 629,000. Nearly a fourth of today's mills are capable of producing more than 2 million board feet per year, and several are capable of producing more than 5 million.

Pulpwood

Before 1967, what pulpwood that was produced in Kentucky was shipped to pulpmills in neighboring states. Hardwood pulpwood moved north, primarily to Ohio, and softwood went south to Tennessee. In 1967, the first woodpulp mill in Kentucky began operating in Hawesville. Although this mill depended primarily on wood residues from other wood-using industries, it marked the beginning of a phenomenal expansion of pulpwood production in the State (Fig. 17). In 1969, a second pulpmill was opened at Hawesville. This mill used mostly roundwood. A third mill at Wickliffe went into production in 1970.

Production rose almost without interruption from 35,000 cords in 1955 to 438,200 in 1973 and 396,400 in 1974, an off year. Before 1960, annual pulpwood production generally ranged from 20,000 to 52,000 cords. In 1973 more than half the pulpwood production of Kentucky was from wood industry residues. Of the portion that was roundwood, more than 83 percent was hardwood. Before the development of pulping capacity, the pulpwood output of Kentucky was almost evenly divided between softwoods and hardwoods.

Before the development of a woodpulp industry, the forest industries in the State were, with the exception of those that produced mine props and

Figure 16.—Custom and commercial sawmills in Kentucky.

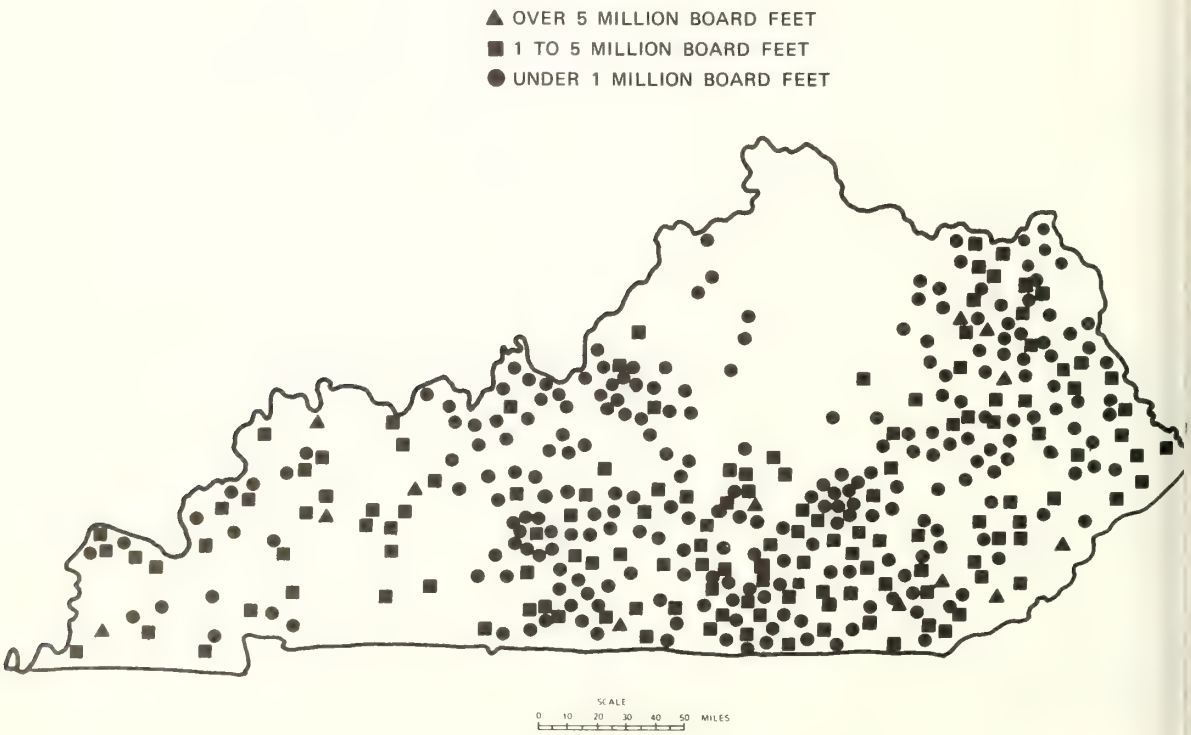
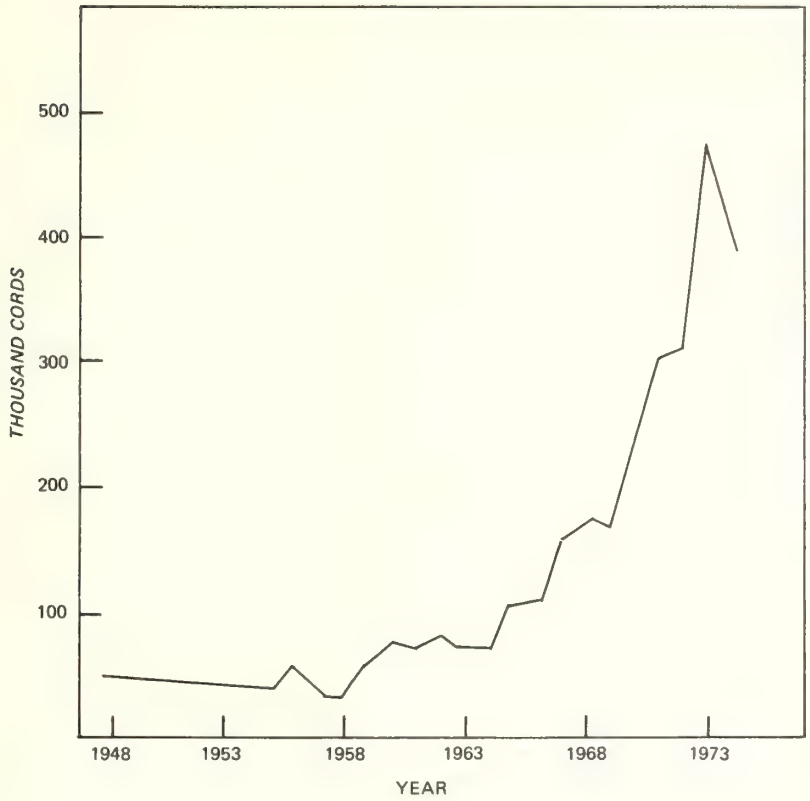


Figure 17.—Pulpwood production in Kentucky, 1948-1974.



charcoal, geared to quality material. The newly emerged pulpwood market provides an outlet for lower grade material, opportunities for integrated logging, and opportunities for profitable timber-stand improvement. The demand for wood residues by the pulpwood market provides sawmills and other wood-using plants with a market for what was previously considered waste. This market often can mean the difference between profit and loss to the plant operator. From an environmental viewpoint, the use of residues for pulpwood reduced the number of unsightly slab piles and slab burners.

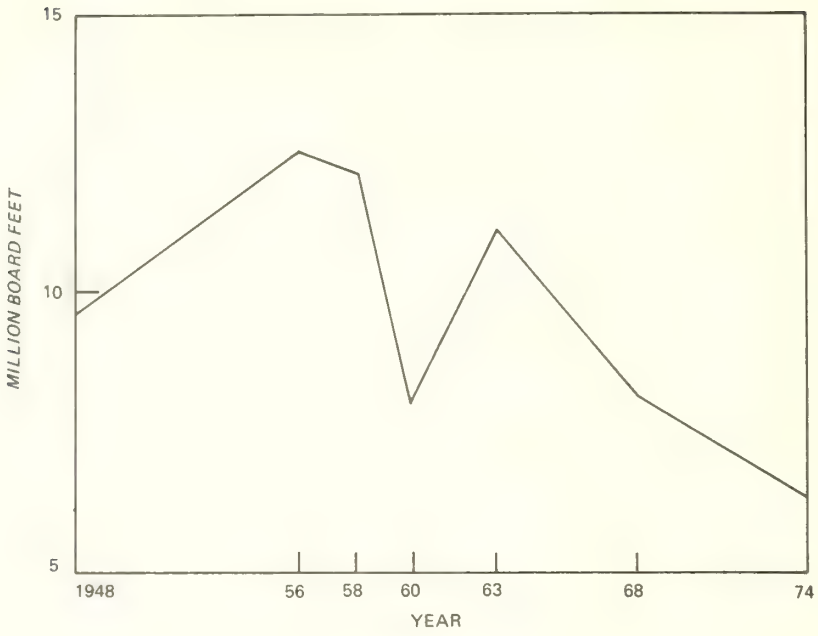
Veneer logs and bolts

The veneer manufacturers in the northeast United States can be separated into three broad classes: (1) manufacturers of commercial and face veneer who produce veneer for the plywood and furniture industries; (2) manufacturers of container veneer who produce veneer boxes, baskets, and similar containers; and (3) specialty manufacturers of veneer who produce a variety of products ranging from toothpicks to tongue depressors. All of the veneer manufacturers in Kentucky produce commercial and face veneer, and generally use species such as black walnut, black cherry, and oak.

In 1974, 6.3 million board feet of veneer logs and bolts were harvested in Kentucky. Of this volume, only 2.4 million board feet were retained in the State to be processed by the four operating veneer plants. Another 4.5 million feet of veneer logs were shipped to Kentucky for processing.

Veneer logs have the highest value per unit of all timber products. This, plus specialization in the veneer industry, means that logs are frequently shipped a considerable distance to consuming mills. This helps explain what happened to the 1974 veneer-log harvest of Kentucky. For instance, although 1.7 million board feet of black walnut veneer logs were harvested, Kentucky mills received 2.7 million board feet. Similarly, 1.9 million board feet of hickory, red oak, and white oak were harvested, yet Kentucky veneer mills received 3.4 million board feet of these species. On the other hand, all of the 1.3 million board feet of cottonwood veneer harvested in Kentucky were shipped out-of-state, probably to container veneer manu-

Figure 18.—Veneer-log production in Kentucky, 1948-1974.



facturers who typically use this species as well as yellow-poplar, soft maple, and sweetgum. In fact, Kentucky mills received only 26 percent of the sweetgum harvest and 16 percent of the yellow-poplar harvest. The rest went out-of-state. Some Kentucky-grown veneer logs even travel to Europe or Japan for processing.

The commercial veneer industry is subject to consumer preference. Production peaked in 1956 at 12.5 million board feet and began to decline until 1963 when there was a brief recovery. However veneer production has declined since 1963 (Fig. 18).

Cooperage-log production

The distilling industry in Kentucky gave rise to the cooperage industry. This industry uses exclusively quality white oak stave bolts. The aging process for most whiskies calls for them to be aged in white oak barrels, which give the spirits their distinctive flavor. Bourbon whisky must be aged in freshly charred barrels that have never been used.

The cooperage industry has been declining for many years. White oak of sufficient size and quality has become increasingly difficult to find. Consumer preferences in alcoholic beverages have shifted away from the whiskies to vodka and gin. In the early 1960's, production of tight cooperage was cut back while the distilling industry awaited the outcome of a proposal to change the federal regulation forbidding the reuse of bourbon barrels for aging whisky. In 1970 the repeal became effective.

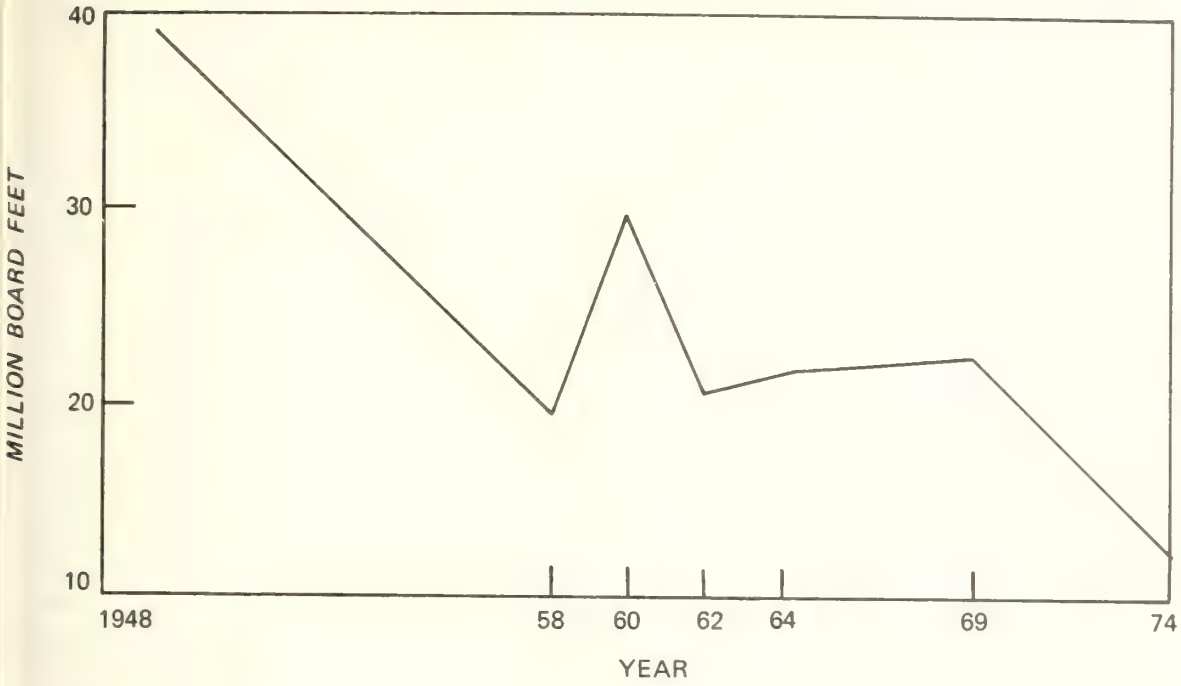
In 1974, 12.2 million board feet of cooperage bolts were produced, down from 21.4 million in 1964 (Fig. 19). The number of cooperage mills operating in Kentucky also dropped from 21 in 1964 to only 12 in 1974. The decline of the cooperage industry is even more precipitous when one considers that in 1948 there were 87 operating cooperage mills receiving 44.0 million board feet of logs and bolts.

The place of timber in the economy of Kentucky

The 98 million cubic feet of industrial roundwood harvested from Kentucky forest land in 1974 had an estimated total stumpage value of nearly $17 million. After the trees had been cut and delivered to the consuming mills, this wood had an estimated value of nearly $41 million. Thus the commercial forest-land area of Kentucky produced an average of $1.42 worth of stumpage or $3.44 worth of delivered timber products per acre.

According to the 1972 Census of Manufacture, wood-processing plants in Kentucky produced $544 million worth of products in that year. This

Figure 19.—Cooperage-log production in Kentucky, 1948-1974.



does not include products from the furniture and fixtures industries. Although furniture plants use considerable volumes of wood, it is difficult to distinguish what portion of the total product value is attributable to the use of wood.

Wood-based industries do not constitute a large share of the total manufacturing—6.2 percent of manufacturing employment and 4.4 percent of the value of manufactured products in 1972. They are, however, significant in many rural counties. In Leslie, Knott, Menifee, and Webster Counties, wood-processing establishments account for more than 50 percent of manufacturing employment. In another 10 counties, they account for 25 to 50 percent of manufacturing employment.

Of the 3,169 manufacturing establishments listed by the 1972 Census of Manufacturers, only 596—less than 19 percent—were engaged in wood-based industries. Such industries tend to be relatively small; they employ only 6 percent of the manufacturing labor force. Average annual wages are also lower than in other manufacturing industries—$6,894 compared to $8,428 in 1972.

Wood-processing plants in Kentucky tend to be concentrated in the primary industries—those that do not produce a finished product. The development of secondary wood-products industries in Kentucky would allow more of the value added in manufacturing to remain in the State. Value added is the difference between the cost of goods purchased by an enterprise and the value of the products it sells. It is the amount available for wages and salaries; interest; profits; and taxes—or the money that keeps both the enterprise and the community at large alive, well, and growing. With the present primary-secondary mix, substantial volumes are shipped out of state for manufacture into final products.

Hair (1963) reported that in 1958 each $1 worth of stumpage cut increased in value 25 times by the time it reached the final consumer. Primary manufacturing added $3.85 while secondary manufacturing added $5.45. While these data are old, the ratios are probably still valid. Secondary manufacturing also contributes substantially to employment in timber-based industries. Secondary manufacturing alone accounts for 24 percent of the employment needed to move wood to the final consumer (Hair 1963). By contrast, the three stages preceeding secondary manufacturing—forest management, harvesting, and primary manufacturing—accounted for only 28 percent. Secondary industries also tend to upgrade the labor force to higher skill levels. Because of the generally higher

capital and skill requirements needed for secondary industries, they usually provide more stable employment.

There are several reasons why a larger secondary wood-based industry has not developed in Kentucky. Most of the heavily forested regions of the State lack adequate plant sites. To be profitable, most plants require several acres of developable land adjacent to rail or highway networks. Topography is an important factor. It is interesting to observe that those wood-using industries that are considered secondary—flooring, furniture parts, wooden furniture, turnery products, veneer, and millwork—tend to cluster on the edges of heavily forested areas rather than within them (Bowman and Haynes 1963).

Another limiting factor is water. A constant supply of water is essential for the woodpulp and paper industries. Yet in most of the heavily forested regions, extreme fluctuations in water supply are common. Water quality is also important in the manufacture of bleached paper.

Most of the timbered regions of Kentucky are far removed from the major consuming areas. The final destination for most secondary wood products manufactured in Kentucky is the urban-industrial eastern seaboard or the shores of the Great Lakes. In most cases, the costs of moving finished goods to these areas would offset the comparative cost advantages of other factors of production, such as wood or labor.

It is frequently argued that the forested regions of Kentucky have a surplus of labor, however this surplus is primarily unskilled and semiskilled. The secondary industries require skilled labor. It may require several years to adequately train an employee.

Any secondary wood-based industry that could develop and thrive in the timbered regions of Kentucky must be one that can balance a comparative disadvantage in one area of its operations against a comparative advantage in another. As seen from the previous discussion, the opportunitues for wood-using industries to achieve this balance in Kentucky are limited. However the establishment of competitive wood industries in rural Kentucky would add greatly to the economic well-being of the region.

TIMBER-SUPPLY OUTLOOK

Although national production of hardwood sawtimber has been projected to increase from 11.2 billion board feet in 1970 to 18.9 billion in 2000 (Forest Service 1973), it is doubtful that Kentucky will contribute much to this increase. This is because of the poor competitive position of the State compared to other major hardwood regions, rather than any inability of the land in the State to grow trees.

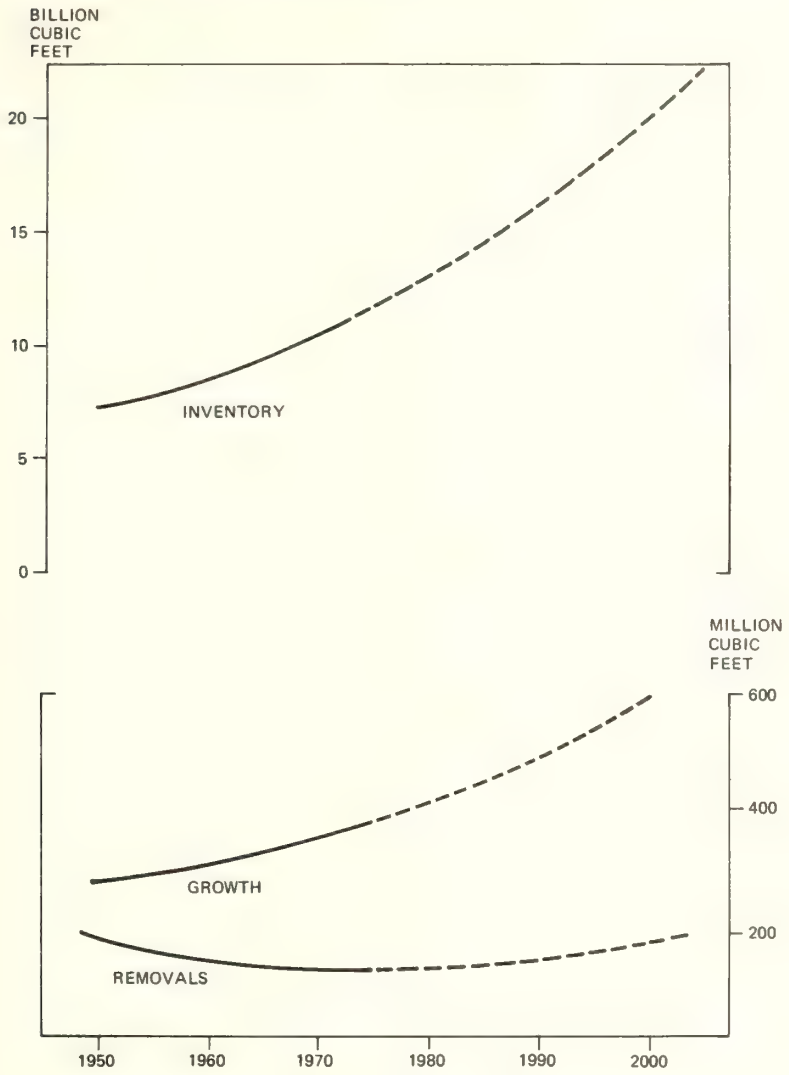
More than one-half of the volume of growing-stock and sawtimber is concentrated in eastern Kentucky, where the timber grows on steep slopes and in narrow valleys. Such sites offer poor opportunities for efficient harvesting with modern equipment. Getting wood to the mill is also difficult because there is seldom a direct route. The forest land of Kentucky is primarily in private ownership, most of it in small tracts. Many of these may be too small to be logged efficiently. For all of these reasons it seems that geography alone has put Kentucky at an economic disadvantage.

What then do we see for the future timber supply of Kentucky? During the 25 years since the first forest inventory, total timber removals declined from 170 million cubic feet in 1948 to 148.9 million in 1974. All of the traditional timber industries of Kentucky declined, the only bright spot being the development of a pulpwood industry. As a result, timber removals declined and the volume of growing stock rose from 7.7 billion cubic feet in 1949 to 11.4 billion in 1974.

Looking into the future we see little evidence of a major reversal of these trends. Forest-land area should not increase significantly. Statewide, the area removed from forest by land use changes is expected to be offset by other areas that are allowed to revert to forest. Although we anticipate a 21-percent increase in timber removals, this added demand will be more than offset by the increasing annual net growth—and the gap between growth and removals will continue to widen. Growth is expected to increase from 391 million cubic feet in 1974 to 661 million in 2004—a 69-percent gain.

The growing-stock inventory is expected to nearly double by 2004—from 11.4 billion cubic feet to 22.5 billion. Growth per acre will increase from 33 cubic feet to 54 cubic feet. Growing-stock volume, which in 1974 was 941 cubic feet per acre, will exceed 1,800 cubic feet per acre in 2004 (Fig. 20).

Figure 20.—Projected trends of inventory, growth, and removals of growing stock, Kentucky, 1949-2004.



TIMBER MANAGEMENT OPPORTUNITIES

Kentucky presents the forester with an assortment of timber-management opportunities or, more correctly, challenges. Seventy-five percent of the commercial forest land—nearly 9 million acres—is capable of producing 50 cubic feet or more per acre per year. One-third of the area is capable of producing 85 or more cubic feet per acre per year. Yet, on average, forest stands in Kentucky produce only 33 cubic feet per acre per year. Perhaps the most important single reason why growth is below potential is that most timber stands in the State are not optimally stocked. Nearly 2.8 million acres are overstocked with trees. However if we remove the rough and rotten trees, the area of overstocked stands drops to only 426,000 acres. This means that on 2.4 million acres, cull trees are competing with growing-stock trees, thus the growth on merchantable trees is reduced. These 426,000 acres contain too many growing-stock trees for optimum growth. Thus an important opportunity exists to reduce many timber stands to an improved level of stocking.

The pessimist will say this is easier said than done, and he's right. It would be a monumental task to treat all of the stands in the State. So it is important to identify, on the ground, those stands that present the best opportunity for success. Some stands are in such poor condition that the most realistic treatment would be to liquidate the present stand and regenerate a new one. This is especially true for the many acres of understocked commercial forest land. In other instances, the stands may be so close to maturity that they will derive little benefit from release. These stands should be carried through to maturity or harvested now and regenerated.

Another obstacle to forest management in Kentucky is the ownership pattern. The average forest-land owner in Kentucky owns about 24 acres—slightly more than half the average in neighboring West Virginia. As a rule of thumb, most foresters would agree that long-term management is difficult for tracts of fewer than 50 acres because they are too small to provide profitable returns at reasonable intervals. Yet, in Kentucky 35 percent of the privately owned commercial forest land is made up of tracts that are fewer than 50 acres.

Another obstacle to forest management in Kentucky is the high turnover of ownership. Twenty-four percent of the commercial forest land owned by individuals has been held by the same owner for fewer than 10 years. Because a minimum of 80 years is required to produce quality hardwood sawtimber, few owners see their tracts through even a significant portion of such a rotation. In addition, only 9 percent of the privately owned commercial forest land in the State is held specifically for timber production. Thirty-one percent is held simply because it is part of the farm or residence.

All of these factors—tract size, turnover rate, and owner objectives or lack thereof—add up to perhaps the largest single obstacle to forest management in Kentucky. Means should be found not only to interest forest-land owners in the continued practice of forest management but also to work with groups of separately owned tracts of forest land over extended periods. Several techniques have been attempted to overcome these obstacles, such as landowner cooperatives and government or industry programs. However most of these programs have achieved only limited success. Perhaps one reason for this is that participation tended to limit the owner's options. Many forest-management activities take on the character of capital improvements. An owner who sells his land before the end of the rotation is not likely to be compensated for his investment.

Fire causes persistent forest-management difficulties in Kentucky. Many rural residents mistakenly believe that burning rids forest land of ticks, snakes, and briars, and improves livestock forage. In fact, few ticks and snakes would be eliminated by burning. While this year's briars may be killed back, next year's will be even thicker because the remaining rootstocks will sprout with renewed vigor. Burning does not improve livestock forage. In fact, fire kills the best grasses and forage plants. What comes in after fire is an abundant crop of plants low in nutrients.

Although fires in hardwood forests are seldom as spectacular as those in coniferous stands, the destructive effect is equally great, and may be longer lasting. Most trees less than 4-inches in dbh, and brush, will be killed outright. This sapling mortality, on the average, represents about 20 years of growth. When fires spread up slopes nearly every tree will be killed, regardless of size. Large trees that aren't killed in a fire may be sufficiently scarred to provide an entryway for decay. It has been estimated that the average fire- wound

ed, merchantable tree loses 15 percent of its volume to decay. But, more significantly, the value of such trees is reduced by 75 percent. This loss to decay and the consequent loss in value are two of the long-term effects of fire in the woods.

Another long-term effect results from the destruction of the layer of litter on the forest floor. The destruction of this layer of partly decomposed leaves, twigs, and other organic material exposes the fragile humus layer to leaching or erosion or both. Eventually, all that may remain is bare mineral soil that is low in nutrients and subject to temperature extremes. It may be many years before an adequate layer of litter is reestablished.

Since the beginning of organized fire control, Kentucky has compiled an impressive record. During the peak logging years of the early 1900's, fire frequently followed the destructive logging practices of the day, and thousands upon thousands of once prime timberland went up in smoke. These destructive fires only added to the time needed for full recovery. From 1949 to 1975, more than 6 million acres of forest land were burned by 91,735 fires. Some areas have been burned several times during this period, so some acres have been counted more than once. But from 1963 to 1975, 1.2 million acres burned; this amount is only 20 percent of the total. So fire control has definitely improved since the second survey of the woodlands of Kentucky. Nearly all of these fires were started by man; debris burning, smoking, and incendiarism were the primary causes. It seems that this problem can be solved only by heightening people's awareness of how potentially destructive their actions can be.

THE FOREST-RELATED RESOURCES OF KENTUCKY

While this resurvey of Kentucky is primarily concerned with timber resources, other important resources are associated with the woodlands of the State. From an ecological perspective, the forest is composed of trees, shrubs, herbaceous plants, animals, microorganisms, soil, rocks, water, air, and solar radiation, all interacting in a vast and complex energy cycle. Though trees are the largest and most dominant part of this system, there is much more to a forest than wood. Resources such as water, soil, coal, fish, and wildlife, as well as recreation potential are inextricably related to each other and to the timber resource. Though they will be discussed one at a time here for the sake of simplicity, isolating any one resource is neither practical nor advisable if a realistic picture of the forests is desired.

Water

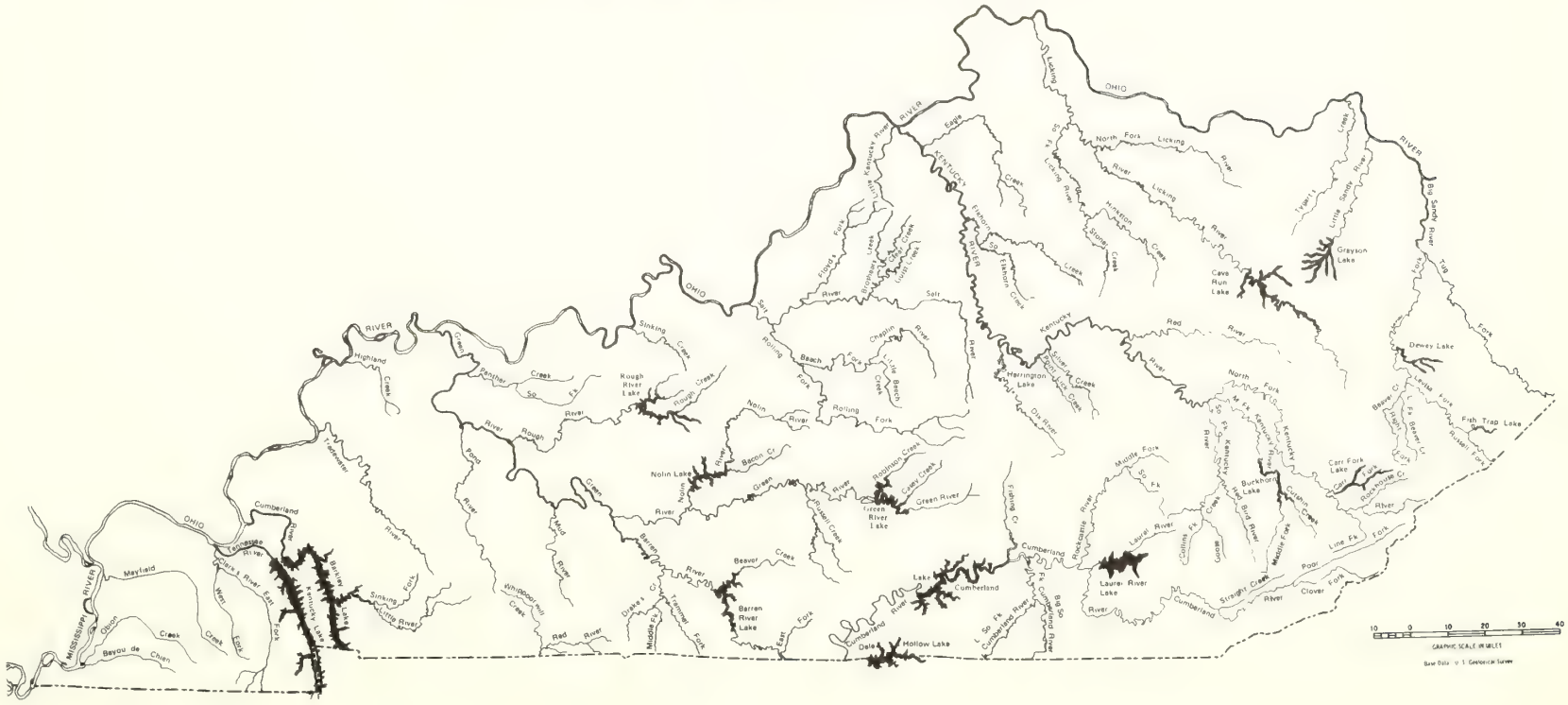
The water resources of Kentucky have changed considerably since Daniel Boone first encountered the abundant free-running and pure streams of the forested wilderness. Nature's balance was first threatened in the late 1800's after man had converted many acres of forest and grassland to plowed fields, and had thoughtlessly logged huge tracts of virgin timber. Then, as the population of Kentucky rose, farming intensified, mining developed, industries began, and cities grew, forest land disappeared at an increasing rate. Consequently, this century began with streams flooding with increasing severity, streambeds filling quickly with silt, streamflows dwindling to dangerously low levels during dry spells, and streams becoming more and more polluted by man's waste products (Kentucky Department of Natural Resources 1971).

What does the disappearance of forest land have to do with these problems? What effects do trees and forests have on water in Kentucky? To answer these questions, we must look at the functions that trees have in the hydrologic cycle.

The major source of water in Kentucky is precipitation in the form of rain—40 to 50 inches per year. Most of the rain that falls on forests is readily absorbed by the litter and humus soil layers that act like a sponge. The capacity of forest soils for infiltration is so high that overland flow or runoff is rare (Lull 1971). Once this water enters the soil, tree roots take in much of it. In a year, forests may transpire one-half of the annual precipitation. To demonstrate the tremendous pumping capacity of trees, it has been shown that a single, moderate-sized willow or cottonwood, growing along the banks of a permanent water course or reservoir, is capable of transpiring over 10,000 gallons per year (Spurr 1964).

Though trees remove this much water from the ground, floods still occur in forested areas. One reason is that the State lies in the path of many storms. These storms occur in winter and in early spring when infiltration, transpiration, and evaporation are at a minimum (Kentucky Department of Natural Resources 1971). Another explanation is that the forests in Kentucky are often found on

Figure 21.—Major streams, rivers, and lakes of Kentucky, 1975.



steep slopes with thin soils. This combination leads to the ground water—water that has percolated through the soil to the water table—moving rapidly enough streamward to produce damaging peak flows (Lull 1971). This is especially true in eastern Kentucky.

When forests are cut but quickly regenerated, this situation is not worsened. But when the forests are removed and the land put to other use, such as agriculture or an urban development, floods occur with greater frequency and severity (Lull 1971). Forests are not the complete answer to flood control, but they help greatly.

Because forests currently make up only 48 percent of the land base of the State, and because afforestation on a large scale is not possible, something else had to be done. To protect man against floods and to meet the growing demand for water, many dams of all sizes were constructed in Kentucky. The reservoirs behind these dams store peak flows and later release water during low flow periods. These manmade bodies of water range in size from small farm ponds to Lake Cumberland, which has the largest volume of water of any lake in the United States east of the Mississippi River and south of the Great Lakes (Kentucky Department of Natural Resources 1971). Figure 21 shows the major streams, rivers, and lakes of Kentucky.

The U.S. Army Corps of Engineers has figured prominently in this construction, having built 14 multipurpose reservoirs, 9 of them since the 1963 forest survey. These dams serve the interests of flood control; municipal, industrial, and agricultural water supply; pollution abatement; navigation; recreation; low flow augmentation; and fish and wildlife. The Corps estimates that flood-control projects have prevented damages totaling nearly $500 million in Kentucky since their completion (U.S. Army Corps of Engineers 1977).

The U.S. Bureau of Census estimated that the water area of Kentucky increased from 532 to 745 square miles from 1960 to 1970. This increase of 40 percent in water area occurred primarily in the Pennyroyal, Western Coalfield, and Western Units, where thousands of acres of artificial lakes have recently been created.

Besides flooding, Kentucky has other water resource problems. An important one is sedimentation. Sediment is fine particles of clay and silt eroded from fields, forests, mine dumps, urban areas, and other areas that eventually end up in streams. Sediment harms the resource by increasing costs for water treatment, decreasing reservoir storing capacities, filling navigable stream channels, and adversely affecting aquatic life (Kentucky Department of Natural Resources 1971). To

Corps of Engineers' Photo.

Reservoir construction affects many forest resources.

control sedimentation, erosion must be minimized.

Forest land use is the best practice for erosion control. Soil fully protected by a cover of litter and humus beneath a forest stand contributes no sediment to streams (Lull 1971). When logging occurs, the potential for erosion rises. Cutting trees causes little or no erosion; erosion occurs when the soil is disturbed by roads and landings constructed to remove the timber. However, with care, a logging operation need not create significant erosion. A study in West Virginia showed the maximum stream turbidity from a cutover watershed with no road plan and no provision for drainage was 56,000 parts per million (ppm); with no road plan but roads drained, 5,200 ppm; with moderate planning and drainage, 210 ppm; and with careful planning and drainage, 25 ppm. For an uncut watershed, the maximum was 15 ppm (Lull 1971).

Also, coal mining often exposes certain minerals that produce acid when they come in contact with water. Acid water is harmful to aquatic life, increases costs for water treatment, decreases soil fertility, kills vegetation, and damages the forest resource for recreation, especially fishing and swimming.

The current reclamation law requires a pH between 6.0 and 9.0 for water leaving a mined area. This is fine for recent operations and present and future operation, but acid drainage remains a problem at older mines where operators did not treat effluent water.

Soil

Soil provides trees with four essentials; anchorage, water, mineral nutrients, and aeration for roots. How well nutrients, water, and air move through the soil to provide a proper rooting medium depends on the physical and chemical properties of the soil. The closer these properties are to meeting the optimum requirements of the tree growing in a soil, the greater will be the soil's po tential productivity for those trees. Also impor tant in determining productivity are surface drain age, slope, stoniness, and erosion potential (Uni versity of Kentucky 1970).

While soils provide certain essentials for tree es tablishment and growth, trees provide soils wit certain benefits that increase soil productivity Tree roots growing through soil increase porosit and aeration of the soil and may even split rocks furthering soil development. Trees also produc considerable organic matter, forming a layer o litter that eventually becomes humus and is incor porated into the fertile topsoil.

The optimum requirements for the growth o trees and agricultural crops often differ. Agricul tural crops grow very poorly on steep slopes wher soils are rocky, thin, and acidic, while trees ma grow quite well on such soils. This is demonstrate by stands of shortleaf pine growing on the escarp ment in eastern Kentucky. Some forest lan cleared for farming subsequently turned out to b only marginally productive and had to be aban doned when times were hard. This land has revert ed to its forested state, and this is the primary rea son why the area of commercial forest lands ha increased since 1949.

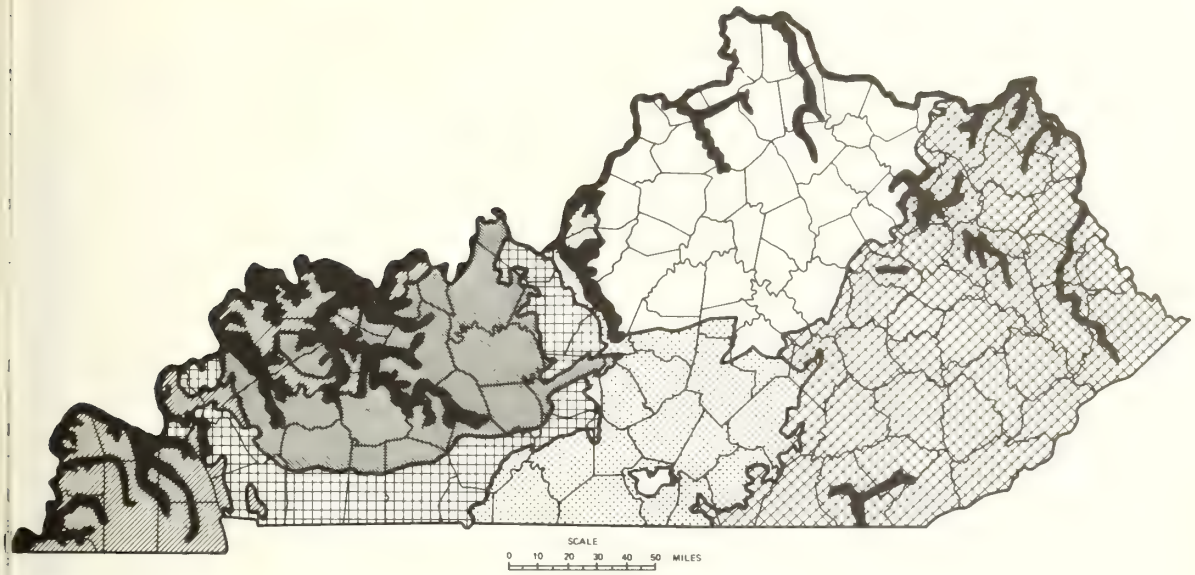
Though most soils will support tree cover, som are more suited for this than others. The Soil Con servation Service has developed woodland suita bility classes for all major soil groups in Kentucky These classes indicate the potential productivity o each soil group to produce tree crops. The follow ing table gives the site index and average annua growth potential for certain species for classes 1 2, and 3. By taking a weighted average of the clas values for each soil type based on acreage pe type, it is possible to determine an average wood land suitability class for each soil association (Fig 22).

Potential productivity for woodland suitability classes of selected species for Kentucky

Species	Class 1 Very high potential productivity		Class 2 High potential productivity		Class 3 Medium potential produ ity	
	Site index (height at age 50)	Average annual growth (bd. ft. per acre)[a]	Site index (height at age 50)	Average annual growth (bd. ft. per acre)	Site index (height at age 50)	Average a ual grow (bd. ft. pe cre)
Upland oaks	85+	350+	75-85	240-350	65-75	160-2
Lowlands oaks	95+	450+	85-95	350-450	75-85	240-3
Sweetgum	95+	500+	85-95	380-500	75-85	280-3
Yellow-poplar	95+	500+	85-95	380-500	75-85	280-3
Virginia pine	85+	650+	75-85	540-650	65-75	450-5
Shortleaf pine	85+	820+	75-85	670-820	65-75	540-6
Loblolly pine	95+	920+	85-95	740-920	75-85	570-7

[a] International 1/4-inch rule.
Source: Technical Guide data, Soil Conservation Service, 1972.

Figure 22.—Soil associations of Kentucky, 1975. (Adapted from a Soil Conservation Service map.)



Symbol		Description	Average woodland suitability class
A		Deep, well-drained to poorly drained soils on nearly level flood plains and undulating terraces of the major streams	1.5
B		Deep, well-drained soils, formed in residuum from limestone with most areas having a thin loess mantle on undulating to rolling upland plains	1.6
C		Deep and moderately deep, well-drained soils formed in residuum or hillside creep material from acid sandstone, siltstone and shale on mountain sides	2.0
D		Deep, well-drained to poorly drained soils, formed in loess on undulating and hilly uplands	2.4
E		Deep and moderately deep, well-drained soils, formed in residuum from acid shales, siltstone and sandstone with most areas having a thin loess mantle on hilly uplands and undulating broad ridgetops	2.5
F		Deep and moderately deep, well-drained soils formed in residuum of cherty or shaly limestone on hilly uplands	2.8
G		Deep, well-drained soils on undulating broad ridgetops and moderately deep or shallow, well-drained soils on hilly uplands, formed in residuum from limestone or interbedded shale and limestone	2.9

Though soils with a wide range of woodland suitability classes are present in each major group, the group averages show general regions in the State that are more suited to timber production than others. For example, the areas with soil group A are best suited for woodland because their average woodland suitability class is 1.5, or halfway between class 1 and class 2 in Table 1. Figure 22 shows these areas to be closely associated with the major river drainages. It is interesting that soil group G, with an average class of 2.9, is found in the Bluegrass Unit, the most agricultural region of the State. Thus the best agricultural land is actually the land least suited for timber production.

Of the several problems in soil resource management, erosion is the greatest. Soils that are too fragile should not receive destructive use. In fact, the Daniel Boone National Forest has prohibited the use of off-road vehicles in certain areas to protect the soil resource. Mass movement, such as slides or slumps, is a form of erosion that is a big problem on fragile soils on steep slopes. Care must be taken to avoid such areas in the construction of logging and mining roads.

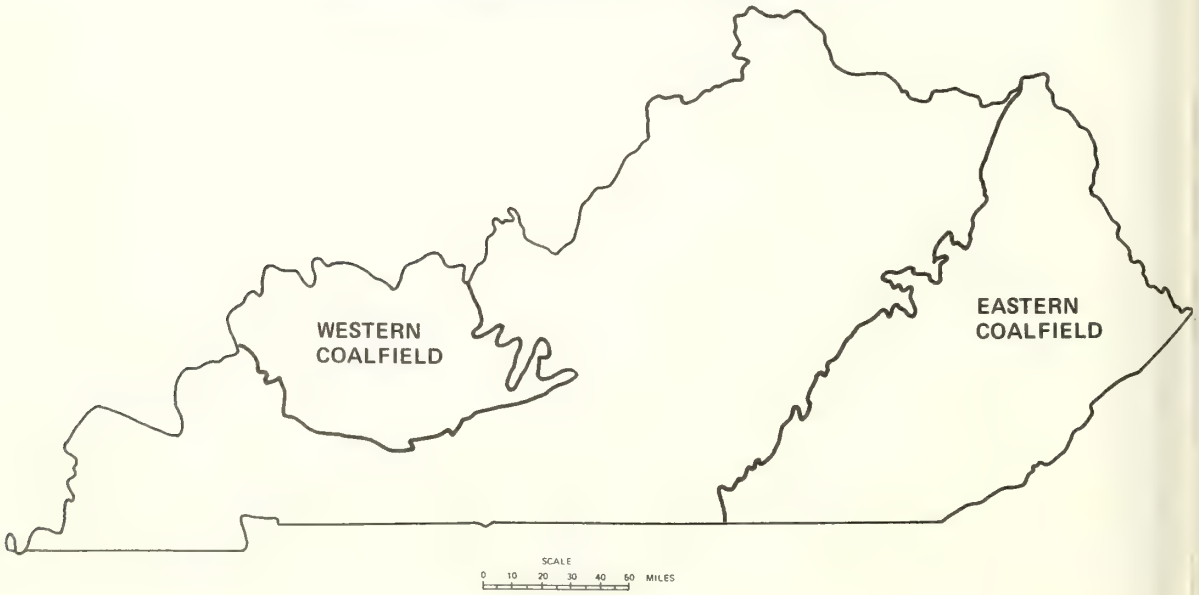
Compaction of soils by machinery or by heavy recreational use damages the resource by reducing aeration and adversely affecting plant-soil-water relations. Compaction reduces the growth of trees, and when severe can lead to stagnation and death. Soils prone to compaction such as clay soils should be avoided or protected with a hardened surface.

Coal

Coal is an ancient forest resource, formed by prehistoric forests some 275 million years ago. As the trees and ferns died, they fell into swamps, forming a tangled mass of decayed matter called peat. Peat is the raw material from which coal is formed; 1 foot of coal requires 5 to 8 feet of peat. After this peat was laid down, the areas sank and became covered with water, sand, and mud. The great pressure from the water above compressed the peat; this pressure forced out oxygen and hydrogen, leaving the carbon that eventually became coal. In some areas, the mantle of the earth buckled and folded, thus increasing the heat and pressure that formed the higher grades of coal (Kentucky Department of Natural Resources 1965).

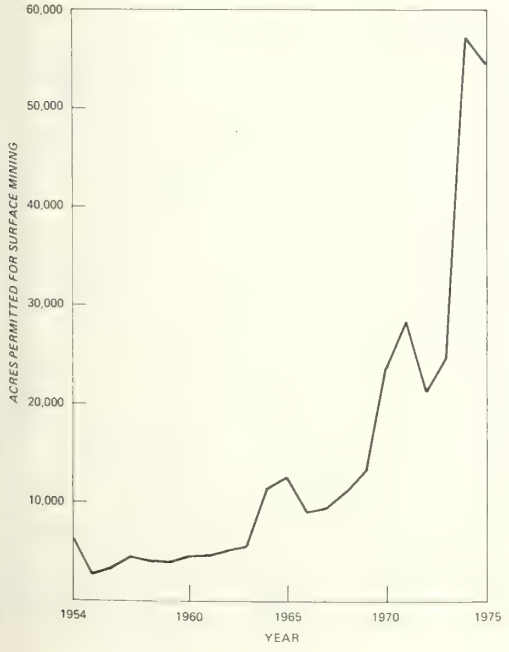
Kentucky is the only state with coalfields in two separate and distinct coal regions (Fig. 23). The eastern field, covering about 7.1 million acres, is in the Appalachian Region while the western field, covering 2.8 million acres, is in the Eastern Interior Region. The eastern field is 79 percent forested and includes 47 percent of the commercial forest land in the State. The western field is 44 percent forested, accounting for 10 percent of the commercial forest land.

Figure 23.—Distribution of coal fields in Kentucky.



While underground and auger mining often ave a detrimental impact on forest land at the ine openings, storage points, waste dumps, and ong haul roads, surface mining has a much reater impact on the State as a whole. Because of is, our discussion here will center on surface ining. Since the Kentucky Division of Reclamaon began operations in 1954, permits to surface ine more than 322,000 acres have been issued. he number of permitted acres has increased draatically in recent years (Fig. 24). These figures, hen averaged over a number of years, are close the number of acres that were actually mined. If ou take the total figure, add 10 percent for haul oads, and take 69 percent of this figure (this is the ercentage of commercial forest land for both oal fields combined) you have an estimate of bout 245,000 acres of commercial forest land nat have been disturbed by surface mining. Since ne last survey, an average of 16,550 acres of forst land has been cleared each year. While this creage is small compared to the forest resources f the State as a whole, the impact is substantial

igure 24.—Acres permitted for surface mining in entucky, 1954-1975.



and the trend is toward more and more land clearing. If all of the coal recoverable by surface mining were stripped, more than 1.3 million acres of the commercial forest land of Kentucky could be disturbed.

In the eastern field there are more than 588,000 acres of commercial forest land in National Forest ownership. The present policy of the Division of Reclamation is not to issue permits for surface mining on any land where the surface rights are owned by the Federal government. This effectively prohibits strip mining on National Forest land. This policy is being contested in court because there is considerable coal tonnage underlying National Forest land. So for the present, the surface forest resources of the National Forests in Kentucky are not affected by the underground coal resource.

It is difficult to state how much of the wood removed from an area to be mined is ever taken to a mill and converted into a product. Though the eastern field is more heavily forested, probably few trees on a mine site are cut and removed to mills due to the rugged terrain, inadequate transportation networks, and distance to production sites and markets. Most of the wood is buried when the overburden is removed. In the western coal field, more of the wood is used because the topography is gentler, transportation networks and access are better, and mills, especially pulpmills, are closer. When an operator decides to mine coal, his decision is rarely dependent on the maturity or condition of the forest cover of the land in question, so many immature stands are affected.

Reclamation of strip mines has obvious consequences for the forest resources. Kentucky passed its first law regulating strip mining in 1954 and has amended this law many times, the last time in 1975. Regulatory controls need to be under constant review, and improved as technology permits. Before the passage of reclamation laws, more than 40,000 acres of forest land in southeastern Kentucky were mined and abandoned without being reclaimed. The Tennessee Valley Authority and the Kentucky Department for Natural Resources and Environmental Protection, with Federal funding, are working on a reclamation demonstration to correct problems of surface water flow, erosion, and acid drainage. The goals are to return the "orphan banks" to productive forest and wildlife use, and to enhance esthetic values. Until

these mines are reclaimed, they will serve only as ugly reminders of what can happen to the coal-associated forest resources in the absence of good reclamation laws that are strictly enforced.

The regulations are meant to correct the undesirable situations associated with strip mining. Besides the excessive and unstable slopes that result in erosion, slides, and outwashes, strip mining leaves unnatural and unethetic contours in the landscape, as well as the obvious highwalls that sometimes make upper slopes inaccessible. To alleviate these conditions, the law requires that area strip mines—generally in the western field—should be graded to the approximate original contour, that no depressions should be left to collect water, and that all highwalls and spoil peaks should be eliminated. On operations producing a bench—generally in the eastern field—highwalls must be reduced or backfilled except when they are solid rock.

While grading lessens erosion and esthetic concerns, revegetation helps even more. Before plant cover can be established, problems with acid spoils and drainage must be overcome. All acid-producing or toxic materials that are disturbed must be buried under 4 feet of clear overburden. In areas approved for grass or legume revegetation—generally in the western field—the spoil pH must be raised to a range of 5.5 or 6.4 by applying limestone. If spoil pH is not raised to at least 4.0, the spoil will not support productive forest cover. In a small sample that included 93 sample points on 11 field plots that fell on spoil areas, 18 points had a pH below 4.0; 31 points were in the 4.0-5.0 range; 38 points were in the 5.0-6.5 range, and 6 points were above pH 6.5. The 4.0-5.0 range is minimally productive for trees; 5.0-6.5 is considered the optimum range for most species (Wilde 1958), and pH over 6.5 is too alkaline for good forest growth.

The revegetation requirements state that strip mines in the eastern field must be seeded within 15 days of grading. In the western field, where the erosion potential is less, the operator must seed within 45 days after grading. Trees must be planted at no less than 800 seedlings per acre, or seeded at the rate of 2 pounds of black locust seed per acre, on all disturbed areas except benches formed by contour mining, level areas created by mountaintop removal, and areas in western Kentucky that are approved for grasses and legumes only. The area above the highwall of any water impoundment must be planted with trees to provide a protective barrier and screen. Acreage on which woody species are planted is declining, however, because many operators have been granted variances to plant grasses instead of trees. It has been estimated that in the past, about 75 percent of reclamation was to trees, but that now only about 25 percent of stripped areas are being revegetated with trees (personal communication, Willis G. Vogel). All roads must be seeded to legumes and permanent grasses. Certain amounts of fertilizer and mulch are also required. A high proportion of the vegetation planted must live at least two growing seasons before the State will release the operator's bond.

Technology related to revegetation of strip mines in the Appalachian coal fields is well advanced, and new technology for more effective reclamation is developing at a rapid rate (Plass 1975). Evaluation of the chemical and physical characteristics of overburden material before mining begins is suggested as the most reliable means of predicting spoil quality and devising a reclamation plan for achieving an appropriate land-management objective (Despard 1974).

Timber production can often be a realistic management objective on reclaimed strip mines. Pulpwood production has potential on certain stripped sites in Kentucky (Plass and Burton 1967). In some ways, strip mines offer advantages for timber production. Areas may be planted to preferred species because competition from undesirable vegetation will be minimal. Also, haul roads may provide access to establish, manage, protect and harvest trees (Davis and Davidson 1968).

Wildlife production is also possible on properly reclaimed lands. Such areas may have small water impoundments; cultivated food strips; and complementary plantings of grasses, legumes, shrubs and conifers (Davis and Davidson 1968). Strip mining often creates many miles of desirable "edge effects". Thus, while strip mining may create a short-term disruption in wildlife populations, it may have the long-term effect of increasing the diversity of wildlife species of the area. Some animals common to strip mines in various stages of reclamation are quail, rabbit, dove, deer, woodchuck, raccoon, and fox (Kays 1967). Mine roads provide access for hunter and nonhunter alike. When acid drainage is eliminated and where erosion is controlled, impoundments left on the reclaimed site may provide good fishing.

Besides the enjoyment of the fish and wildlife

esources, strip mines can be reclaimed for other ecreational uses. Clean impoundments often ake excellent swimming areas. The presence of ater will attrack campers and picnickers to ined areas that have been revegetated in an esthetically pleasing manner with trees and grasses.

ish and Wildlife

Forests affect fish habitats in several beneficial ays. Shade lowers stream temperatures, improvng the habitat for cold-water fish such as trout. orests along streams and around reservoirs proect the waters and the fish in them by yielding surace and ground water at relatively stable rates, ven during storms. Water from forested waterheds is generally free of sediment. Sediment is ad for fish—it kills insects and other preferred oods and decreases living space by filling pools. lso, areas that are forested to the edge of a tream stabilize streambanks. This improves fish abitat by reducing erosion. Trees left standing in eservoir areas before flooding, such as at Cave un Lake, attract fish once the area is flooded. mproving fish habitat increases the numbers of arger and sportier fish.

Because of the influence of forests, the State has nany waters providing good habitats for a varied ish population. Besides the 14,000 miles of streams and rivers, Kentucky has 41 public fishing lakes—nearly 6,000 acres, many private lakes, more than 50,000 farm ponds, and 18 reservoirs with about 200,000 acres of water surface (SCORP 1975).

Kentucky is known for its good fishing. Of all forest-related recreational activities, fishing ranks first in the State. On Corps of Engineers reservoirs, nearly one-quarter of all recreational use is fishing. Figures supplied by the Kentucky Department of Fish and Wildlife Resources show that 5.6 million days per year are spent fishing, with fishermen spending about $20.3 million per year. The fact that about 600,000 fishing licenses are sold yearly also attests to the widespread popularity of this activity. Since there is no closed season on angling, the fish resource of Kentucky can be enjoyed year round.

Because of the great demand for this resource, there is an active fish-stocking program. The State of Kentucky operates the Minor E. Clark Fish Hatchery at Cave Run Lake, and the U.S. Fish and Wildlife Service operates a National Fish Hatchery near Frankfort, and is constructing a National Trout Hatchery at Wolf Creek Dam that will reach full production in 1979. The two operating hatcheries released more than 3 million large mouth and small mouth bass, channel catfish,

Fishing in a wooded setting is a popular pastime for many in Kentucky.

Corps of Engineers' Photo.

bluegills, redbreasted sunfish, walleye, rockfish (striped bass), and muskellunge into the waters of Kentucky in 1975. Until the new trout hatchery is operating, Kentucky will continue to stock its 500 miles of suitable trout streams and deeper lakes, such as Cumberland and Laurel River, with trout from neighboring states. The Kentucky Department of Fish and Wildlife Resources estimates an annual harvest of 6 million pounds of fish, much of which originates in the ponds of several fish hatcheries.

The fish resources are not without problems. Pollution in the form of coal washings, mine acid, sediment, and oil spills account for significant fish kills each year. Except for coal-related pollutants, most of the agents harmful to fish originate in nonforest areas. With diligent efforts to reclaim strip mines properly and to control deep mine by-products, coal-related pollutants can be reduced to negligible levels.

Wildlife other than fish can be divided into two broad groups: nongame species and game species. Until recently, little attention was given nongame wildlife management. Besides filling essential ecological niches, nongame animals, as well as game species, provide significant recreational opportunities for the nonhunting public. On the Reelfoot National Wildlife Refuge in southwestern Kentucky, bird watching is a year-round activity. Long-range plans include the development of additional nature study trails, including a trail equipped with photographic blinds (SCORP 1975). John James Audubon, the famous ornithologist, came to Henderson, Kentucky, in 1818 because the town is on a major flyway. The State has established a park there in honor of this great naturalist.

A major thrust for the management of nongame species in Kentucky has been the protection of endangered and threatened species. Five species on the United States List of Endangered Species may be found in Kentucky at one time or another—the American peregrine falcon, the red-cockaded woodpecker, the Indiana bat, the southern bald eagle, and Kirtland's warbler. These species, most of which are in some way dependent on forest land, are protected, and destruction of their critical habitat is prohibited. Greater emphasis on wildlife management on the 11 million acres of privately owned commercial forest land is necessary to preserve this important resource.

Popular game species include squirrels, rabbits, quail, grouse, deer, turkeys, raccoons. opossums, furbearers (hunted and trapped), doves, woodcock, geese, ducks, and frogs. These species are associated with forests to varying degrees; they range from waterfowl that need the clean water produced by forests to squirrels that depend exclusively on trees for food and shelter. Certain forest types are more favorable to some animals than are other types, primarily because of available food and cover. Even more important in determining desirable habitat is the stand-size and transition zones between different-size stands. Some species, like wild turkey, prefer mature and extensive hardwood stands. Others, like rabbit, are commonly found in scrubby seedling-and-sapling stands. Kentucky, with considerable acreages in all three stand sizes, is biologically capable of producing good populations of many kinds of game animals.

The wildlife resource of Kentucky has changed considerably since the 18th century when the State was covered with virgin hardwood forests. As an indication of the abundance of game, Dr. Thomas Walker, who in 1750 led an expedition into what is now Kentucky, reported that during the trip his party killed 13 buffalo, 8 elk, 53 bear, 20 deer, 4 geese, 150 turkeys, and many small game. He stated, "We might have killed three times as much game, had we wanted it" (Collins 1975). Among the species once common in the State that have since disappeared or become rare are the American bison, black bear, bobcat, beaver, elk, otter, panther, passenger pigeon, prairie chicken, and wolf. Habitat destruction, caused by clearing much forest land, along with uncontrolled hunting and trapping, led to the decline of these species (SCORP 1975).

The story of managing whitetailed deer in Kentucky demonstrates the success of cooperative efforts. Heavy hunting had, for all intents and purposes, eliminated the deer herd in Kentucky by 1880. Realizing the need to build up the deer population (as well as the populations of other game species) the Forest Service and the State entered into a cooperative agreement, and the Beaver Creek Wildlife Management Area was established in 1940, only 3 years after the Cumberland National Forest (now the Daniel Boone) came into being. The area encompassed 10,687 acres and has a wildlife population of: 0 deer, 0 turkeys, 40 grouse, 100 squirrels, 50 rabbits, 5 raccoons, 100 quail, and 20 opossum. Hunting was prohibited, suitable habitats were encouraged, and deer from

Forests support many popular game species including Kentucky's favorite—squirrel.

Kentucky Department of Fish and Wildlife Photos

western Kentucky were brought into the area. The Forest Service was responsible for protecting and managing the habitat, while the Kentucky Department of Fish and Wildlife Resources was responsible for protecting and managing the resident wildlife populations (Collins 1975). The Beaver Creek Area has been expanded to cover 15,000 acres, and another area, the Redbird River Wildlife Management Area—covering 19,000 acres—was added to this program. Two additional areas have been proposed. Latest estimates of a deer population of 120,000 for the State indicate the success of such programs.

Kentucky has 48 public hunting areas covering slightly more than 1 million acres, much of which is forested. Several public agencies carry out extensive wildlife management on many of these areas, but because of heavy hunting, these lands may be inferior to some privately owned lands. Thirty-four percent of private owners, who own 5 million acres of commercial forest land, allow hunting on their lands. Also, only 14 percent of all private owners post their 2.1 million acres of commercial forest land. Only 3 percent post land to control hunting, indicating weak antihunting sentiment among forest-land owners.

One unusual area is the 7,300 acre Pioneer Weapons Hunting Area on the Daniel Boone. This area was opened to bow hunting in 1955, and other primitive weapons such as crossbows, flintlock and percussion cap rifles, and muzzle-loading shotguns and pistols were permitted in 1962. All modern breech-loading firearms are excluded. Though hunter success is lower in this area, the popularity of this kind of hunting increases each year.

While hunting is not as popular as fishing, hunters spend an estimated 4,550,000 days pursuing game each year. More than 300,000 hunting licenses were sold in 1974, and hunters spend approximately $13.2 million on this sport. Each year hunters kill approximately 5.1 million small game and 10,000 big game (deer and turkey). The fish and wildlife forest resources not only provide popular outdoor recreation to thousands of people, but they also supplement the larder of many a family.

Habitat destruction from activities such as industrial development, mining, and farming is a problem for Kentucky wildlife. Any activity that significantly reduces the amount of commercial forest land has a negative impact on the populations of nearly all wildlife species. Activities such as strip mining and reclamation, which cause only short-term destruction of habitat are preferrable to irretrievable habitat loss from activities such as those caused by urban expansion.

Deer poaching is another serious problem, especially in eastern Kentucky. Poaching has reduced deer populations significantly, and is difficult to control. Law enforcement officers are too few, and they are sometimes even shot at when attempting to perform their duties. The solution to this problem seems to be public education. The Department of Fish and Wildlife Resources has an active information and education program using television, conservation magazines, and public discussions to inform people of this situation and suggest ways to bring it under control. Deer are also harassed and even killed by free-running dogs, though this is a minor problem compared to poaching.

Outdoor recreation

Outdoor recreation is an important use of forest land. It is a human experience that, when pursued in the forest, is dependent on the many other forest-related resources. Outdoor recreation is also the most people-oriented of all forest uses, with its benefits generally received directly. Forest recreation is now and will likely continue to be one of the most valuable uses of all our forest resources.

Most forest recreation occurs on lands administered by public agencies. Since there is a wide variety of experiences available, and since each agency places a different emphasis on recreation management, discussion of public forest recreation will center on the more dominant agencies. Figure 25 shows the distribution of public recreation areas with associated forest land in Kentucky.

The Kentucky Department of Parks administers 15 major resort parks and 13 recreational parks that offer recreational activities in a forest setting. This park system is recognized as one of the finest in the United States. While most of these parks draw people because of their excellent facilities rather than the forest resource itself, many forest- and water-oriented activities are available. They include nature study, hiking, fishing, boating, camping, picnicking, and horseback riding. Some parks are noted for their unique resources. One of these is Cumberland Falls, which is the largest waterfall, except for Niagara, east of the Rocky Mountains. Several parks have amphitheaters

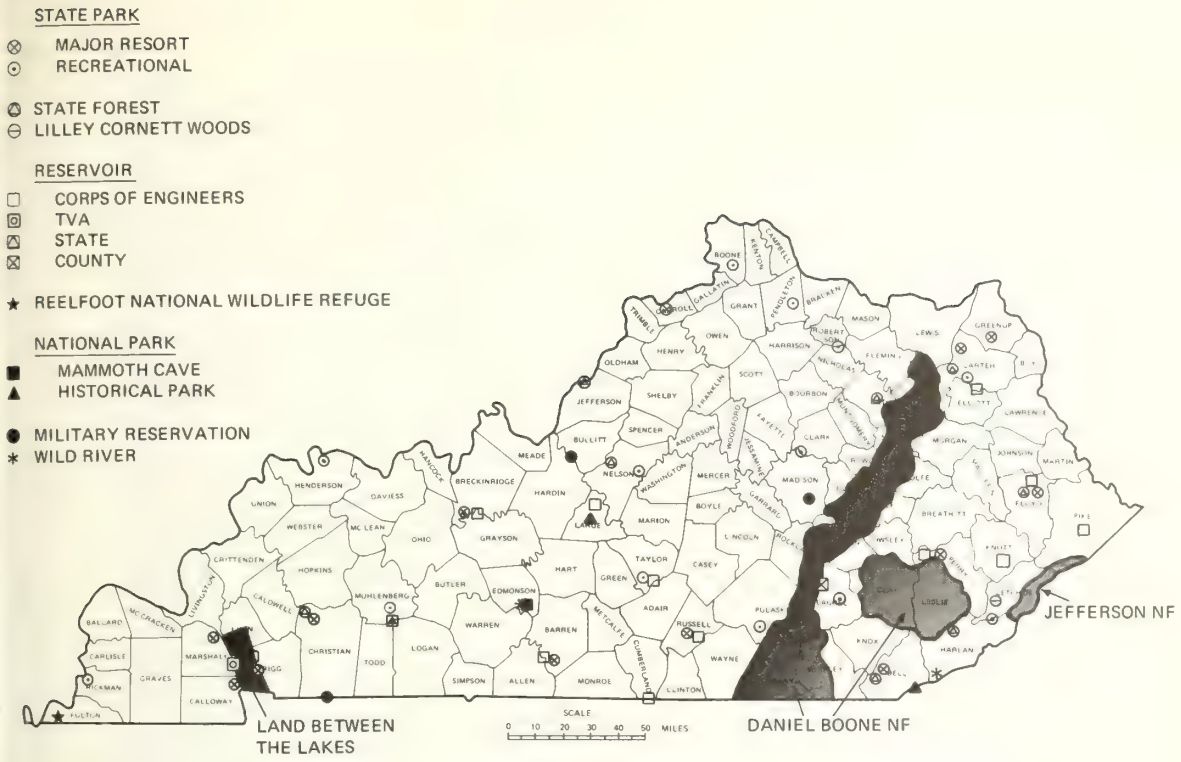


Figure 25.—Public recreation areas with associated forest land in Kentucky.

situated in forested environments where programs on the history and culture of Kentucky are offered.

The Kentucky Division of Forestry under the Department for Natural Resources and Environmental Protection administers eight state forests. While these forests are managed primarily for timber, people enjoy several recreational activities in these areas. Hiking and picnicking are probably most popular, followed by hunting, fishing, and camping. Because there is only one developed campground in the state forests, most camping is primitive. The three forests near state parks are also used by park visitors.

The same department administers Kentucky's eight wild rivers designated by the Wild Rivers Act of 1972. Six rivers are on Forest Service land and one runs through Mammoth Cave National Park. The streams are the Cumberland River from the summer shoals to the backwater of Lake Cumberland; Red River, Rockcastle River; Rock Creek; Green River; and the Big South Fork, Little South Fork, and Martin's Fork of the Cumberland River. These streams are free-flowing, esthetically pleasing, and essentially free from the works of man. The areas include land no more than 2,500 feet from the center of the streams or to the visual horizon. Selective logging and existing farming are allowed on these lands while mining and construction of any impoundments, roads, or buildings are prohibited. These streams are accessible only by foot, horseback, canoe, and nonmotorized boat, so recreational use is limited.

The U.S. Army Corps of Engineers has built 14 multiple-purpose reservoirs in Kentucky, and administers 12 of these, in part, for forest-and water-related recreation. The lakes are popular since bodies of water associated with forest land are highly desirable recreation areas. Visitation figures provided by the Corps show that the major forest/water recreational activities rank as follows in participation: 1. sightseeing, 2. fishing, 3. boating and water-skiing, 4. camping, 5. swimming, and 6. picnicking.

The Tennessee Valley Authority administers Kentucky Lake and adjacent Land Between the Lakes (LBL) in western Kentucky. In this State, LBL covers about 106,000 acres, 90,000 (or 85

Kentucky's wild rivers flow through heavily forested areas of the State.

Kentucky Division of Forestry Photo.

percent) of which are forested. Except for the Daniel Boone National Forest, LBL is the largest publicly owned forest area in Kentucky. Begun in 1964, LBL is being developed as a national demonstration in outdoor recreation and environmental education. Besides the popular fishing, swimming, and boating activities associated with the lakes, LBL has an active program for group and family campers. Three modern campgrounds developed especially for family camping are available as are 26 areas for informal day activities or more primitive camping. Visitors are encouraged to hike the 126 miles of trails throughout LBL. Many of these are interpretive trails, and some demonstrate the benefits of proper natural resource management. There is also a Wranglers Camp for horseback riders. And, for the off-road vehicle enthusiast, there are 2,500 acres set aside for this use.

The Forest Service administers 588,800 acres of

commercial forest land in Kentucky, nearly all of which is in the Daniel Boone National Forest. While timber is the most important forest resource on the Forest, recreation is becoming increasingly important. In 1973, the Daniel Boone ranked 60th out of nearly 130 National Forests in the United States in recreational use. In 1974, the Forest was ranked 40th, and by 1975 it had climbed to 24th place. This dramatic increase in use is attributable, in large part, to the two reservoirs, Cave Run and Laurel River, recently impounded by the Corps.

Since the lakes are relatively new, many facilities are still being constructed, so the public has not begun to use these recreation sites to their full potential. Plans call for facilities such as information centers, paved roads, parking lots, flush toilets, two-family camping units, boat-launching ramps, beaches, and picnicking units. Nearly all forest recreational activities will be available when development is complete.

Another recent addition to the recreation spectrum of the Daniel Boone National Forest is an area designated by Congress in 1975 as Beaver Creek Wilderness. This area, covering about 5,000 acres, has been relatively undisturbed since the 1930's. It is isolated below a well-defined cliff line. These cliffs are the major scenic feature within the area; this area is also characterized by clear streams and immature stands of a variety of forest types. A few mature trees still stand in the steeper, narrow side hollows. The wilderness is also part of a wildlife-management area, so hunting is controlled. Other uses are backpacking and fishing. Streams were stocked by helicopter, but this method was discontinued because it disturbed the wilderness character of the area.

The Red River Gorge Geological Area in the Daniel Boone is a popular attraction. This unique landscape of 25,000 acres contains more than 40 natural arches and an unusual assortment of vegetation. The area is managed for protection of natural features, water, wildlife, and recreation. More than 40 miles of scenic drives and trails lead users to many overlooks, picnic areas, and dispersed campsites. The threat of a Corps reservoir flooding this area has lessened recently, though plans for the project have not been scrapped.

The relative popularity of various activities of the Daniel Boone reflects the more forested environment. In 1975, the major recreational activities, in order of participation, were: 1. sightseeing, 2. camping, 3. hiking and nature programs, 4. hunting, 5. boating, 6. fishing, and 7. picnicking.

Besides LBL, the National Forest is the only large public forest area with many trails. There are currently about 137 miles of trails; also planned is the development of a North-South Trail that would run the length of the major section of the Forest.

The National Park Service administers almost 58,000 acres of forest land on the Mammoth Cave National Park, the Cumberland Gap National Historical Park, and the Abraham Lincoln Birthplace National Historical Site. The Park Service emphasizes interpretation of the primary features of its parks, and most of its visitors are drawn to the main attractions. Mammoth Cave Park, besides its tour of the cave, offers guided nature walks, hiking trails, a campground, picnic tables, and evening campfire programs. Cumberland Gap's main attraction is an overlook offering a majestic view of forested mountains in three states: Kentucky, Virginia, and Tenessee. Besides sightseeing, back-country camping and hiking are popular, and good trout fishing is available. Outdoor activities at the Abraham Lincoln Birthplace are limited to nature walks and trails, and evening campfire programs.

As for forest recreation on privately owned land, 39 percent of the private owners—who control 5.7 million acres of commercial forest land—would allow some public use. Most of these owners would allow hunting, while hiking, picnicking, camping, and fishing were often mentioned as permissable activities. There are pockets of virgin timber on private land that have recreation potential, but these areas are not publicized because public notice would likely lead to the decline of this small but precious forest resource.

Recreation resource management is difficult because 455,600 private owners control 92 percent of the State's commercial forest land. It is difficult to manage a forest area large enough to be desirable for many activities if the land is controlled by many owners, all of whom may have different land-management objectives. This, coupled with the fact that recreation demands exceed supply, leads to the problem of too many people on too few acres of forest land.

Other problems include the conflicting uses of forest-related resources. Demand for areas for off-road vehicles is so great, for instance, that erosion of the forest soil resource concerns land man-

agers. This erosion also affects the associated water and timber resources. Another example is that no logging is allowed on state parks, so some stands are showing signs of deterioration due to heavy use and old age.

Though the forest-related resources have been discussed separately, it is obvious that they are all closely related. The fundamental tenet of ecology is that all components of any ecosystem are mutually dependent. In a forest, the various resources are intricately linked, as in a three-dimensioned jigwaw puzzle. But unlike the rigid puzzle, the forest is dynamic. Trees die and are replaced by seedlings or sprouts. Soil erodes and is also built up by decaying litter. Coal is mined and the area is reclaimed. The examples are endless, but the point is clear—the forest is an ever changing amalgam of interrelated resources.

These individual resources, while important singly, only realize their greatest value when they are considered as integral parts of the whole. The problems affecting one resource subsequently affect the other resources. The solutions to these problems must begin with an understanding of these relationships.

LITERATURE CITED

Bones, James T.
1977. The timber industries of Kentucky. U.S. Dep. Agric. For. Serv. Resour. Bull. NE-50. 26 p.

Bones, James T., and Chauncey J. Lohr.
1972. Primary wood-product industries of Kentucky—1969. U.S. Dep. Agric. For. Serv. Resour. Bull NE-24. 38 p.

Bowman, Mary Jean, and W. Warren Haynes.
1963. Resources and people in East Kentucky: Problems and potentials of a logging economy. Johns Hopkins Press, Baltimore, Md. 448 p.

Caudill, Harry M.
1962. Night comes to the Cumberlands. Little Brown, Boston. 394 p.

Collins, Robert F.
1975. A history of the Daniel Boone National Forest. U.S. Dep. Agric. For. Serv. 349 p.

Davis, Grant, and Walter H. Davidson.
1968. Coal-mine spoil banks offer good potential for timber and wildlife production. Pa. For. 58:20–21.

Despard, Thomas L.
1974. Avoid problem spoils through overburden analysis. U.S. Dep. Agric. For. Serv. Gen. Tech. Rep. NE-10. 4 p.

Gansner, David A.
1968. The timber resources of Kentucky. U.S. Dep. Agric. For. Serv. Resour. Bull. NE-9. 97 p.

Hair, Dwight.
1963. The economic importance of timber in the United States. U.S. Dep. Agric. For. Serv. Misc. Pub. 941. Washington, D.C. 91 p.

Hutchison, O. Keith, and Robert K. Winters.
1953. Kentucky's forest resources and industries. U.S. Dep. Agric. For. Serv. For. Resour. Rep. No. 7, Washington, D.C. 56 p.

Kays, Carl E.
1967. Strip mined lands as fish and wildlife habitat. *In* Strip Mining Symposium. Ky. Dep. Nat. Resour. Div. Reclamation, July 13–14, 1967, Owensboro, KY. 5 p.

Kentucky Department of Natural Resources, Division of Water.
1971. The Kentucky framework water plan. 237 p.

Kentucky Department of Natural Resources, Strip Mining and Reclamation Commission.
1965. Strip mining in Kentucky. (Compiled by Robert Montgomery and edited by Paul Camplin.) 56 p.

Lull, Howard W.
1971. Effects of trees and forests on water relations. *In* Trees and forest in an urbanizing environment. Coop. Ext. Serv Univ. Mass. Plann. Resour. Dev. Ser. 17:39–41.

Plass, William T.
1975. Reclamation of surfaced mined lands. Ohio J. Sci. 75(6): 298–304.

Plass, William T., and James D. Burton.
1967. Pulpwood production potential on strip-mined land in the South. J. Soil Water Conserv. 22(6): 235–238.

SCORP.
1975. Kentucky statewide comprehensive outdoor recreation plan. Frankfort.

Spurr, Stephen H.
1964. Forest ecology. Ronald Press, New York. 352 p.

University of Kentucky, Cooperative Extension Service, Agriculture and Home Economics.
1970. Soils handbook. Misc. Publ. 383. 41 p.

U.S. Army Corps of Engineers.
1977. Water resources development in Kentucky. Louisville 112 p.

U.S. Bureau of the Census.
1971. 1970 Census of population, number of inhabitants, Kentucky. Final Rep. PC(1)–A19 Ky. U.S. Dep. Commer., Washington, D.C. 35 p.

U.S. Bureau of the Census.
1972. 1970 Census of population, general social and economic characteristics, Kentucky. Final Rep. PC(1)–19 Ky U.S. Dep. Commer., Washington, D.C. 528 p.

U.S. Forest Service.
1973. The outlook for timber in the United States. U.S. Dep. Agric. For. Resour. Rep. 20. 367 p.

Widner, Ralph R., Ed.
1968. Kentucky: Back from scrub. *In* Forests and forestry in the American States. Natl. Assoc. State For., Washington, D.C. p. 322–337.

Wilde, S. A.
1958. Forest soils. Ronald Press, New York. p. 216.

APPENDIX

Definition of terms

Acceptable trees. Growing-stock trees of commercial species that meet specified standards of size and quality, but do not qualify as desirable trees.

Annual net growth trend-level. The estimated growth of growing stock or sawtimber for a specific year that is consistent with the average annual growth during the period between surveys and with the current inventory. (1974 for Kentucky.)

Area condition class. A classification of commercial forest land based upon stocking of acceptable and desirable trees and other conditions affecting current and prospective timber growth.

Average annual ingrowth of growing stock. The net cubic-foot volume of trees now classed as growing stock that were less than 5.0 inches dbh on the previous survey, divided by the length of the period between surveys.

Average annual ingrowth of sawtimber. The net board-foot volume of trees now classed as sawtimber that were not tallied as such on the previous survey, divided by the length of the period between surveys.

Average annual mortality of growing stock. The net cubic-foot volume removed from the growing stock because of death from natural causes during the period between surveys, divided by the length of the period.

Average annual mortality of sawtimber. The net board-foot volume removed from sawtimber trees by death from natural causes during the period between surveys, divided by the length of the period.

Average annual net growth of growing stock. The change (resulting from natural causes) in volume of sound wood in sawtimber and poletimber trees during the period between surveys, divided by the length of the period. Components of annual net growth of growing stock include the increment in net volume of trees present at the beginning of the period and surviving to its end, plus net volume of trees reaching poletimber size during that period, minus the net volume of trees that died during the period, minus cull increment (the net volume of trees that became rough or rotten during the period).

Average annual net growth of sawtimber. The change (resulting from natural causes) in net board-foot volume of sawtimber trees during the period between surveys, divided by the length of the period. Components of annual net growth of sawtimber include the increment in net volume of sawtimber trees present at the beginning of the period and surviving to its end, plus the net volume of trees reaching sawtimber size during the period, minus the net volume of sawtimber trees that died during the period, minus cull increment (the net volume of sawtimber trees that became rough or rotten during the period).

Average annual removals of growing stock. The net cubic-foot volume of growing-stock trees harvested or killed in logging, cultural operations such as timber-stand improvement, land-clearing, or changes in land use during the period between surveys, divided by the length of the period.

Average annual removals of sawtimber. The net board-foot volume of sawtimber trees harvested or killed in logging, cultural operations such as timber-stand improvement, land clearing, or changes in land use during the period between surveys, divided by the length of the period.

Basal area. The area in square feet of the cross section at breast height of a single tree, or of all trees in a stand, usually expressed as square feet per acre.

Board foot. A unit of lumber measurement 1 foot long, 1 foot wide, and 1 inch thick, or its equivalent.

Commercial forest land. Forest land producing or capable of producing crops of industrial wood (more than 20 cubic feet per acre per year) and not withdrawn from timber utilization.

Commercial species. Tree species presently or prospectively suitable for industrial wood products. Excludes species of typically small size, poor form, or inferior quality, such as hawthorn and sumac.

County and municipal lands. Lands owned by counties and local public agencies or municipalities or leased to them for 50 years or more.

Cull increment. The net volume of growing-stock trees on the previous inventory that became rough or rotten trees in the current inventory.

Desirable trees. Growing-stock trees of commercial species: (a) having no serious quality defects that limit present or prospective use for timber products; (b) of relatively high vigor, and (c) containing no pathogens that may result in death or serious deterioration before rotation age.

Diameter at breast height (dbh). The diameter

outside bark of a standing tree measured at 4 1/2 feet above the ground.

Farmer-owned lands. Lands owned by farm operators, whether part of the farmstead or not. Excludes land leased by farm operators from nonfarm owners.

Federal lands. Lands (other than National Forests) administered by Federal agencies.

Forest industry lands. Lands owned by companies or individuals operating wood-using plants.

Forest land. Land stocked with at least 7.5 square feet of basal area per acre of any size forest trees or that formerly had such tree cover and is not currently developed for nonforest use. The minimum area for classification of forest land is 1 acre.

Forest trees. Woody plants that have well-developed stems and are usually more than 12 feet in height at maturity.

Forest type. A classification of forest land based upon the species forming a plurality of live tree stocking. The many forest types in Kentucky were combined into the following major forest type groups: (a) white and red pine—forests in which eastern white pine, red pine, or hemlock, singly or in combination, comprise a plurality of the stocking; in Kentucky this major type has only one local type—hemlock; common associates include hard pine, oak, maple, and yellow-poplar; (b) loblolly and shortleaf pine—forests in which loblolly, shortleaf, or other southern yellow pines except longleaf or slash pine, singly or in combination, comprise a plurality of the stocking; in Kentucky major species include eastern redcedar, Virginia pine, and shortleaf pine; (c) oak-pine—forests in which hardwoods (usually upland oaks) comprise a plurality of the stocking but in which pines comprise 25 to 50 percent of the stocking; (d) oak-hickory—forests in which upland oaks or hickory, singly or in combination, comprise a plurality of the stocking and in which pines comprise less than 25 percent of the stocking; in Kentucky common associates include hard pine, maple, beech, ash, yellow poplar, blackgum, and elm; (e) oak-gum—bottomland forests in which tupelo, blackgum, sweetgum, oak, or southern cypress, singly or in combination, comprise a plurality of the stocking and in which pines comprise less than 25 percent of the stocking; in Kentucky common associates include hickory, maple, yellow-poplar, and beech; (f) elm-ash-red maple—forests in which elm, ash, or red maple, singly or in combination, comprise a plurality of the stocking; in Kentucky common associates include oak, hickory, river birch, yellow-poplar and sycamore; (g) maple-beech-birch—forests in which sugar maple, beech, or yellow birch, singly or in combination comprise a plurality of the stocking; in Kentucky there is very little yellow birch; common associates include oak, hickory, yellow-poplar, and basswood.

Growing-stock trees. Live trees of commercial species classified as sawtimber, poletimber, saplings, and seedlings; that is, all live trees of commercial species except rough and rotten trees.

Growing-stock volume. Net volume, in cubic feet, of growing-stock trees 5.0 inches dbh and larger, from a 1-foot stump to a minimum 4.0 inch top diameter outside bark of the central stem or to the point where the central stem breaks into limbs. Net volume equals gross volume less deduction for cull.

Hardwoods. Dicotyledonous trees, usually broad-leaved and deciduous.

Industrial wood. All roundwood products except fuelwood.

International 1/4-inch rule. A log rule, or formula, for estimating the board-foot volume of logs. The mathematical formula is: $[\{D^2 \times 0.22\} - 0.71\ D] \times 0.904762$ for 4-foot sections, where D = diameter inside bark at the small end of the section. This rule is used as the USDA Forest Service Standard Log Rule in the eastern United States.

Land area. (a) Bureau of Census: the area of dry land and land temporarily or partly covered by water, such as marshes, swamps, and river flood plains; streams, sloughs, estuaries, and canals less than one-eighth statute mile wide; and lakes, reservoirs, and ponds less than 40 acres in area; (b) Resources Evaluation: same as (a), except that the minimum width of streams, etc., is 120 feet, and the minimum size of lakes, etc., is 1 acre.

Logging residues. The unused growing-stock volume of trees cut for products and the total growing-stock volume of trees destroyed in the course of logging but not removed for products.

Miscellaneous private lands. Privately-owned lands other than forest-industry and farmer-owned lands.

National forest lands. Federal lands legally designated as National forests or purchase units and other lands administered as part of the National Forest System by the Forest Service.

Noncommercial forest land. Unproductive and productive-reserved forest land.

Noncommercial species. Tree species of typically small size, poor form, or inferior quality that normally do not develop into trees suitable for industrial wood products.

Nonforest land. Land that has never supported forests, or land formerly forested but now in nonforest use such as crops, improved pasture, residential areas.

Nonstocked areas. Commercial forest land that has less than 12.5 square feet of basal area per acre of growing-stock trees.

Other removals. The growing-stock volume of trees that were removed from the inventory and not used for products by cultural operations (weeding, thinning, etc.), land clearing, or reclassification of some commercial forest land as noncommercial forest land.

Plant byproducts. Wood products, such as slabs, edgings, and veneer cores, obtained incidental to production of timber products and utilized in the manufacture of other timber products. (Bark is not included.)

Plant residues. Wood material produced incidental to production of timber products but not utilized.

Poletimber stands. Stands stocked with at least 12.5 square feet of basal area per acre of growing stock with half or more of such stocking in poletimber or sawtimber trees or both, and in which the stocking of poletimber exceeds that of sawtimber.

Poletimber trees. Live trees of commercial species meeting regional specifications of soundness and form and at least 5.0 inches in dbh but smaller than sawtimber size.

Productive-reserved forest land. Forest land sufficiently productive to quality as commercial forest land, but withdrawn from timber utilization through statute, administrative designation, or exclusive use for Christmas-tree production.

Rotten trees. Live trees of commercial species that do not contain at least one 12-foot sawlog or two noncontiguous sawlogs, each 8 feet or longer, now or prospectively, and do not meet regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of the cull volume in a tree is rotten.

Rough trees. (a) The same as rotten trees, except that rough trees do not meet regional specifications for freedom from defect primarily because of roughness or poor form, and (b) all live trees of noncommercial species.

Roundwood products. Logs, bolts, or other round sections cut from growing stock or nongrowing stock for industrial or nonindustrial uses.

Saplings. Live trees 1.0 through 4.9 inches in dbh.

Sapling-seedling stands. Stands stocked with at least 12.5 square feet of basal area per acre of growing stock with half or more of such stocking in saplings or seedlings or both.

Sawlog. A log meeting minimum standards of diameter, length, and defect, including logs at least 8 feet long, and with a minimum diameter inside bark of 6 inches for softwoods and 8 inches for hardwoods. (See specifications under Log Grade Classification.)

Sawlog portion. That part of the bole of a sawtimber tree between the stump and the sawlog top; that is, the merchantable height.

Sawlog top. The point on the bole of a sawtimber tree above which a sawlog cannot be produced. The minimum sawlog top is 7.0 inches in diameter outside bark (dob) for softwoods and 9.0 inches in dob for hardwoods.

Sawtimber stands. Stands stocked with at least 12.5 square feet of basal area per acre of growing stock with half or more of such stocking in poletimber or sawtimber trees or both, and in which the stocking of sawtimber is at least equal to that of poletimber.

Sawtimber trees. Live trees of commercial species at least 9.0 inches in dbh for softwoods or 11.0 inches for hardwoods containing at least one 12-foot sawlog or two noncontiguous 8-foot sawlogs and meeting regional specifications for freedom from defect.

Sawtimber volume. Net volume in board feet, International 1/4-inch rule, of sawlogs in sawtimber trees. Net volume equal gross volume less deductions for rot, sweep, and other defects that affect use for lumber.

Seedlings. Live trees less than 1.0 inch in dbh that are expected to survive.

Site class. A classification of forest land in terms of inherent capacity to grow crops of industrial wood. Classifications are based upon the mean annual growth of growing stock attainable in fully stocked natural stands at culmination of mean annual growth.

Softwoods. Coniferous trees, usually evergreen, having needles or scale-like leaves.

Stand. A group of forest trees growing on forest land.

Stand-size class. A classification of forest land based on the size class; that is, seedlings, saplings, poletimber or sawtimber of growing-stock trees on the area.

Standard cord. A unit of measure for stacked bolts of wood, encompassing 128 cubic feet of wood, bark, and air space. Cord estimates can be derived from cubic-foot estimates of growing stock by applying an average factor of 80 cubic feet of wood (inside bark) per cord. (Except for pulpwood where a conversion of 85 cubic feet/cord is used because of the more uniform character of pulpwood.)

State lands. Lands owned by the Commonwealth of Kentucky or leased to the State for 50 years or more.

Stocking. The degree of occupancy of land by trees, measured in terms of basal area of trees in a stand compared to the basal area of trees required to fully utilize the growth potential of the land (or the stocking standard). This standard, in the eastern states, is 75 square feet of basal area per acre. The level of stocking, from a management perspective, is seen as a range of values rather than single points. An overstocked stand is stocked with at least 130 percent of the basal-area standard. A fully stocked stand lies within the range of 100 to 130 percent stocked. A medium stocked stand is between 60 to 100 percent stocked. A poorly stocked stand is below 60 percent stocked.

Three categories of stocking are used:

- All live trees—these are used to classify forest land and forest types.
- Growing-stock trees—these are used to classify stand-size classes and area-condition classes.
- Desirable trees—these are used to classify area-condition classes.

Timber products. Roundwood products and plant byproducts from all sources.

Timber removals. The growing-stock volume of trees removed from the inventory for roundwood products, plus logging residues and other removals.

Unproductive forest land. Forest land that is incapable of producing 20 cubic feet per acre per year of industrial wood under natural conditions, because of adverse site conditions.

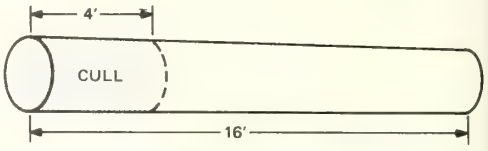
Upper-stem portion. That part of the main stem or fork of a sawtimber tree above the sawlog top to a diameter of 4.0 inches outside bark or to the point where the main stem or fork breaks int limbs.

Log-grade classification

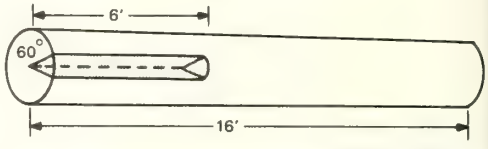
Log grades are a classification of logs based o external characteristics as indicators of quality c value. The log-grade standards and grading sy tems for softwoods and hardwoods used in th forest survey of Kentucky are shown in the follow ing specifications:

Methods of determining scaling deduction.

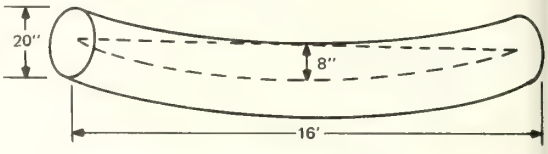
(Examples based on a 16-foot log with 20-inch scaling diameter



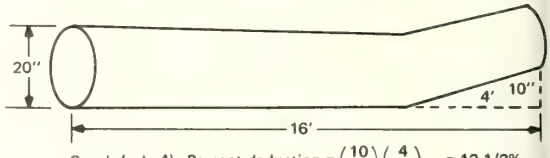
Defect section (rule 1): Percent deduction = $\frac{4}{16}$ = 25%



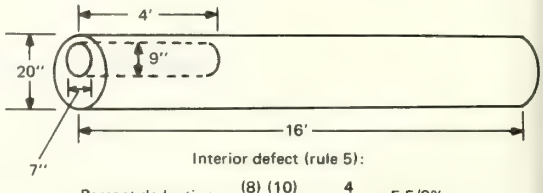
Defect section (rule 2): Percent deduction = $\left(\frac{6}{16}\right)\left(\frac{60}{360}\right)$ = 6-1/4



Sweep (rule 3): Percent deduction = $\frac{8-2}{20}$ = 30%



Crook (rule 4): Percent deduction = $\left(\frac{10}{20}\right)\left(\frac{4}{16}\right)$ = 12-1/2%



Interior defect (rule 5):

Percent deduction = $\frac{(8)(10)}{(20-1)^2} \times \frac{4}{16}$ = 5-5/9%

In practice each elipse axis can be divided by (20–1)

Thus $\frac{8}{19}$ = .4, $\frac{10}{19}$ .5, and (.4) (.5) $\left(\frac{4}{16}\right)$ = 5%

From: Grosenbaugh, L.R. 1952. Shortcuts for cruisers and scalers. U.S. Dep, Agric. For. Serv. South. For Exp. Stn. Occas. Pap. 126.

SPRUCE, FIR, HEMLOCK, TAMARACK, AND CEDAR LOG GRADE

(Minimum merchantability specifications)

Log grade	Minimum size		Defect allowance		Other requirements
	Diameter[1]	Length[2]	Sweep or crook	Total deduction	
	Inches	*Feet*	*Percent*	*Percent*	
1	10-12	8-16 in 2-foot multiples	25	50	Sound knots not over 2 inches in diameter permitted. Shake permitted up to 20 percent of gross scale if not combined with other serious defects.
	13+	8-16 in 2-foot multiples	25	50	Sound knots not over 3 inches in diameter permitted. Shake permitted up to 20 percent of gross scale if not combined with other serious defects.

[1]At small end of log.
[2]Without trim.

SOUTHERN PINE SAWLOGS

Grade 1. Logs with 3 or 4 clear faces.[1] Code 1.

Grade 2. Logs with 1 or 2 clear faces. Code 2.

Grade 3. Logs with no clear faces. Code 3.

After the tentative log grade is established from above, the log will be degraded one grade for each of the following, except that no log can be degraded below grade 3.

1. *Sweep.* Degrade any tentative 1 or 2 log one grade if sweep amounts to 3 or more inches and equals or exceeds one third (1/3) the diameter inside bark at small end. This is the final grade if there is no evidence of heart rot.

2. *Heart rot.* Degrade any tentative 1 or 2 log one grade if conk, massed hyphae, or other evidence of advanced heart rot is found anywhere in it.

[1] A face is one-fourth of the circumference in width extending full length of the log. Clear faces are those free of: knots measuring more than one-half inch in diameter, overgrown knots of any size, holes more than one-fourth inch in diameter. The faces may be rotated if necessary to obtain the maximum number of clear ones.

STANDARD GRADES FOR HARDWOOD FACTORY LUMBER LOGS.[a]

Grading Factors		Log grades							
		F1			F2				F3
Position in tree		Butts only	Butts & uppers		Butts & uppers				Butts & uppers
Scaling diameter, inches		13-15[b]	16-19	20 +	11 +[c]	12 +			8 +
Length without trim, feet		10 +			10 +	*8-9*	*10-11*	*12* +	8 +
Required clear cuttings[d] of each of 3 best faces[e]	Min. length, feet	7	5	3	3	3	3	3	2
	Max. number	2	2	2	2	2	2	3	No limit
	Min. proportion of log length required in clear cutting	5/6	5/6	5/6	2/3	3/4	2/3	2/3	1/2
Maximum sweep & crook allowance	For logs with less than 1/4 of end in sound defects	15%			30%				50%
	For logs with more than 1/4 of end in sound defects	10%			20%				35%
Maximum scaling deduction		40%[f]			50%[g]				50%

End defects, although not visible in standing trees, are important in grading cut logs. Instructions for dealing with this fact are contained in Forest Prod. Lab. Rpt. D 1737.

[a]From USDA Forest Service Research Paper FPL-63 (13).

[b]Ash and basswood butts can be 12 inches if they otherwise meet requirements for small #1's.

[c]Ten-inch logs of all species can be #2 if they otherwise meet requirements for small #1's.

[d]A clear cutting is a portion of a face, extending the width of the face, that is free of defects.

[e]A face is 1/4 of the surface of the log as divided lengthwise.

[f]Otherwise #1 logs with 41-60% deducations can be #2.

[g]Otherwise #2 logs with 51-60% deductions can be #3.

STANDARD SPECIFICATIONS FOR HARDWOOD CONSTRUCTION LOGS.[a]

osition in tree		Butt & upper
lin. diameter, small end		8 inches +
lin. length, without trim		8 feet
lear cuttings		No requirements.
weep allowance, absolute		1/4 diameter small end for each 8 feet of length.
ound urface efects	Single knots	Any number, if no one knot has an average diameter above the callus in excess of 1/3 of log diameter at point of occurrence.
	Whorled knots	Any number if sum of knot diameters above the callus does not exceed 1/3 of log diameter at point of occurrence.
	Holes	Any number provided none has a diameter over 1/3 of log diameter at point of occurrence, and none extends over 3 inches into included timber.[b]
nsound surface defects		Same requirements as for sound defects if they extend into included timber.[b] No limit if they do not.
nd efects	Sound	No requirements.
	Unsound	None allowed; log must be sound internally, but will admit 1 shake not to exceed 1/4 the scaling diameter and a longitudinal split not extending over 5 inches into the contained timber.

[a]These specifications are minimum for the class. If, from a group of logs, factory logs are selected first, thus leaving only non-ctory logs from which to select construction logs, then the quality range of the construction logs so selected is limited, and the ass may be considered a grade. If selection for construction logs is given first priority, then it may be necessary to subdivide the ass into grades.

[b]Included timber is always square, and dimension is judged from small end.

From: Rast, E. D., D. L. Sonderman, and G. L. Gammon, A GUIDE TO HARDWOOD LOG GRADING (REVISED). USDA For. Serv. en. Tech. Rep. NE-1, 1973.

Forest Survey methods

The Resources Evaluation unit of the North-astern Forest Experiment Station used the mpling with partial replacement (SPR) design in ie reinventory of the timber resource of Ken-ucky. With this design, estimates of forest area id timber volume were made by combining a gression updating of the previous inventory ased on a subsample of remeasured plots and a w independent photo- and ground-plot in-ntory. Thus the SPR design, by combining two dependent estimates of the inventory, yields a atistically more accurate estimate of the timber source than other methods at the same cost.

Remeasurement

One estimate is based on the updating of the 1963 survey. This required the remeasurement of 1,062 second-inventory ground plots. With the area-change and current volume estimates obtained from the remeasurement sample plots, regression techniques were used to update the 1963 inventory to obtain an independent estimate of current timber volume and forest area.

In addition to estimating current timber volume and forest area, the survey was designed to obtain an estimate of the components of average annual change during the period between the second and third inventories. These components include area

change from forest to nonforest and vice versa, timber growth, timber removals, and timber mortality. All this information was obtained from the remeasured plots. The timber-change components were obtained by a tree-by-tree reconciliation on each remeasured plot. The reconciliation code for each remeasured tree was used to make estimates of the components of change, by species. These estimates were expressed as average annual figures by dividing the totals for the period by the number of years between measurements. They were then used in the computations of annual net growth, mortality, and removals for 1974.

New-ground phase

The source of the new independent estimates of volume and forest area was a new aerial-photo stratification with a subsample of ground measurements. This photo sample of Kentucky consisted of 38,268 points on the latest available aerial photography. A subset of 1,538 of these photo plots (including 996 on forest land, 536 on nonforest land, and 6 on nonproductive land) was located on the ground. Land use was verified and tree-measurement data were recorded on the forested plots. These plots consisted of a cluster of 10 prism points systematically arranged to cover approximately 1 acre. At each point, trees were selected for tally by using a prism with a basal-area factor of 37.5. Area-attribute data were also tallied at each of the 10 points.

County data

Many users of resources evaluation data need county information. To provide such information, within the framework of the survey design, tables for counties have been developed, based on a survey-unit partitioning technique.

First, the geographic stratum means and variances for the various photo-plot strata were applied to the photo-plot data for each county within the stratum. This yielded an estimate of total volume or total commercial forest-land area for each county. Second, the data from all the new ground plots in each geographic stratum were used to partition the county totals into their various components. For example, if a table of cubic-foot volume by softwoods and hardwoods is to be made for a county, the estimate of total cubic-foot volume for that county is partitioned into softwood and hardwood totals according to the proportion of softwoods and hardwoods for all new Resources Evaluation ground plots within the geographic stratum.

Comparisons between inventories

After inventories have been completed fo several points in time, it is desirable to evaluate th trends between the inventories and to make com parisons. A comparison of the 1949, 1963, an 1975 Resources Evaluation estimates of volum growth, removals, and mortality was made fo Kentucky. A computer program, TRAS (timbe resource analysis system) was used.

Because of changes in procedures and in defin tions, it was necessary to adjust the 1949 and 196 inventory-volume estimates to what they woul have been had the 1975 procedures and definitio been used. An important step in this process wa to recalculate the 1949 and 1963 inventory vo umes, using the average net volume per tree deve oped by the third inventory. To do this, the ave age net volume per tree (for softwoods and har woods) developed from the third survey for eac 2-inch diameter class was multiplied by the nun ber of trees in each 2-inch diameter class from th 1949 and 1963 inventories. *These adjusted est mates, not the estimates published in the repor of the earlier surveys, are the basis for compar sons between surveys shown in this report.*

Data processing

Field-tally data consisting of plot and indivi ual-tree information were processed and compil into tables using FINSYS—Forest Inventory Sy tem—on modern, large-capacity, high-speed com puters.

FINSYS is a data-processing system consistin primarily of a series of computer programs deve oped by the Northeastern Forest Experiment St tion to process and compile a large volume of fo est-inventory data. The system consists of an edi ing subsystem that edits field-tally data for error a table-compiling subsystem that compiles tabl from edited field data; and an output subsyste that expands the plot data to geographic unit statewide estimates and prints the final tables.

FINSYS was described in a series of researc papers by R. W. Wilson and R. C. Peters in 196 *The Northeastern Forest Inventory Data Proces ing System,* USDA Forest Service Research Pape NE-61 and NE-70 to 80.

FINSYS has several features that make

unique. One of these is it flexibility. The system is not restricted to the Northeastern forest survey but can be used for any large-scale forest inventory. Also, the system does not produce a standard set of tables. The user specifies the tables that he desires. Thus at any stage in the data-processing phase, or at a later date, a specific table can be developed with minimum effort.

Another feature of FINSYS is its ability not only to calculate inventory estimates but also to calculate the variance and sampling error for each estimate. This feature provides the user with a measure of the reliability of each statistic, and the ability to determine the reliability of a new estimate based on any data combination.

Reliability of the estimates

The forest-area and timber-volume data presented in this report were based upon a carefully designed sample of forest conditions throughout Kentucky. However, since neither every acre nor every tree in the State was measured, the data presented in this report are estimates. A measure of the reliability of these estimates is given by a sampling error. An associated sampling error was calculated for each estimate in this report. Many of these appear in the data tables.

Here is an example of how to use sampling errors. The total growing-stock volume estimate of Kentucky, 11,444 million cubic feet, is our best estimate. It has an associated sampling error of 1.1 percent, or 126 million cubic feet. This means that if there are no errors in procedure, the odds are 2 to 1 that if we repeated the survey in the same way, the resulting estimate of growing-stock volume would be between 11,318 million cubic feet and 11,570 million or 11,444 ± 126. Similarly, the odds are 19 to 1 that it would be within ± 252 and 300 to 1 that it would be within ± 378 million cubic feet.

The computed sampling error is not a complete measure of reliability. There are other sources of error that this term does not include. There could be imperfections in volume tables and equations and errors in field measurement. Procedural errors were kept to a minimum by careful training of all personnel, frequent inspection of field work, and application of the most reliable survey methods.

Commercial tree species of Kentucky

Occurrence[1]	*Common Name*	*Scientific Name*[2]
	Softwoods	
c	Eastern redcedar	*Juniperus virginiana*
c	Shortleaf pine	*Pinus echinata*
c	Pitch pine	*P. rigida*
vr	Eastern white pine	*P. strobus*
vr	Scotch pine[3]	*P. sylvestris*
r	Loblolly pine[3]	*P. taeda*
c	Virginia pine	*P. virginiana*
vr	Baldcypress	*Taxodium distichum* var. *distichum*
vc	Eastern hemlock	*Tsuga canadensis*
	Hardwoods	
vc	Red maple (soft)[4]	*Acer rubrum*
r	Silver maple	*A. saccharinum*
vc	Sugar maple (hard)[4]	*A. saccharum*
r	Buckeye	*Aesculus* spp.
vr	Yellow birch	*Betula alleghaniensis*
r	Sweet birch (black)[4]	*B. lenta*
r	River birch	*B. nigra*
vc	Hickory	*Carya* spp.
r	American chestnut	*Castanea dentata*
c	Hackberry	*Celtis occidentalis*
vc	Flowering dogwood	*Cornus florida*
c	Common persimmon	*Diospyros virginiana*

c	American beech	*Fagus grandifolia*
c	White ash	*Fraxinus americana*
vr	Black ash	*F. nigra*
c	Green ash	*F. pennsylvanica*
vr	Blue ash	*F. quadrangulata*
r	Honeylocust	*Gleditsia triacanthos*
vr	Kentucky coffeetree	*Gymnocladus dioicus*
r	American holly	*Ilex opaca*
r	Butternut	*Juglans cinerea*
c	Black walnut	*J. nigra*
c	Sweetgum	*Liquidambar styraciflua*
vc	Yellow-poplar	*Liriodendron tulipifera*
r	Magnolia	*Magnolia* spp.
c	Black tupelo (blackgum)[4]	*Nyssa sylvatica*
c	American sycamore	*Platanus occidentalis*
r	Eastern cottonwood	*Populus deltoides*
vr	Bigtooth aspen	*P. grandidentata*
c	Black cherry	*Prunus serotina*
vc	White oak	*Quercus alba*
vr	Swamp white oak	*Q. bicolor*
c	Scarlet oak	*Q. coccinea*
vr	Northern pin oak	*Q. ellipsoidalis*
c	Southern red oak	*Q. falcata* var. *falcata*
r	Cherrybark oak	*Q. falcata* var. *pagodaefolia*
r	Shingle oak	*Q. imbricaria*
vr	Overcup oak	*Q. lyrata*
vr	Bur oak	*Q. macrocarpa*
r	Swamp chestnut oak	*Q. michauxii*
c	Chinkapin oak	*Q. muehlenbergii*
r	Pin oak	*Q. palustris*
r	Willow oak	*Q. phellos*
c	Chestnut oak	*Q. prinus*
c	Northern red oak	*Q. rubra*
r	Shumard oak	*Q. shumardii* var. *shumardii*
c	Post oak	*Q. stellata* var. *stellata*
vc	Black oak	*Q. velutina*
c	Black locust	*Robinia pseudoacacia*
r	Black willow	*Salix nigra*
c	Basswood	*Tilia* spp.
c	Winged elm	*Ulmus alata*
c	American elm	*U. americana*
c	Slippery elm	*U. rubra*
r	Rock elm	*U. thomasii*

[1] Occurrence is based on the frequency of tally of commercial species on forest survey field plots: vr—very rare (<0.05%), r—rare (0.05-0.49%), c—common (0.5-4.9%), and vc—very common (≥5.0%).

[2] Names according to: Little, Elbert L., Jr. Checklist of native and naturalized trees of the United States (including Alaska). U.S. Dep. Agric. Handb. 41, 472 p. 1953.

[3] Species introduced into Kentucky.

[4] Names in parentheses are other frequently used common names.

Index to tables

Statistical Tables for the State

Table No.

FOREST LAND

1 Area by land class
2 Ownership class
3 Stand-size and ownership class
4 Stand-volume and ownership class
5 Stocking class based upon components
6 Area-condition and ownership class
7 Potential site productivity and ownership class
8 Forest type group and ownership class
9 Forest type group and stand-size class
10 Forest type and forest type group
11 Noncommercial forest land, by forest type group
12 Number of trees, by species group, tree class, and diameter class
13 Number of growing-stock trees, by species and diameter class

TIMBER VOLUME

14 Class of timber and species group
15 Ownership and stand size, by species group
16 Growing stock and sawtimber, by forest type group and species group
17 Species and diameter class (growing stock)
18 Species and diameter class (sawtimber)
19 Species and quality class (sawtimber)

ANNUAL GROWTH, REMOVALS, AND MORTALITY

20 Components of average annual change, by species group
21 Growth, removals, and mortality of growing stock and sawtimber, by species
22 Growth and removals of growing stock and sawtimber, by ownership class and species group
23 Mortality of growing stock and sawtimber, by ownership class, cause, and species group
24 Sampling errors for major forest-area and timber-volume classes for Tables 1 through 23

OUTPUT OF TIMBER PRODUCTS (by softwoods and hardwoods)

25 Timber products, by source of material
26 Roundwood products, by source
27 Growing stock and sawtimber removals
28 Unused residues, by industry and type of residue
29-30 Projections of growing stock and sawtimber, by species group, for annual growth, cut, and inventory

Statistical Tables for Geographic Units

FOREST LAND

31 Area by land class and geographic unit
32 Ownership class and geographic unit
33 Stand-size class and geographic unit
34 Stand-volume class and geographic unit
35 Stocking-percent class and geographic unit
36 Area-condition class and geographic unit
37 Potential site productivity class and geographic unit
38 Forest type group and geographic unit

NUMBERS OF TREES

39 Growing-stock trees and rough and rotten trees, by diameter class, species group, and geographic unit
40 Growing-stock trees in the Western Unit, by species and diameter class
41 Growing-stock trees in the Western Coalfied Unit, by species and diameter class
42 Growing-stock trees in the Pennyroyal Unit, by species and diameter class
43 Growing-stock trees in the Bluegrass Unit, by species and diameter class
44 Growing-stock trees in the Northern Cumberland Unit, by species and diameter class
45 Growing-stock trees in the Southern Cumberland Unit, by species and diameter class
46 Growing-stock trees in the Eastern Unit, by species and diameter class

TIMBER VOLUME

47 Class of timber and geographic unit
48 Growing stock and sawtimber, by ownership class and geographic unit
49 Growing stock and sawtimber, by stand-size class and geographic unit
50 Growing stock and sawtimber, by forest type group and geographic unit
51 Growing stock in the Western Unit, by species and diameter class
52 Growing stock in the Western Coalfield Unit, by species and diameter class
53 Growing stock in the Pennyroyal Unit, by species and diameter class
54 Growing stock in the Bluegrass Unit, by species and diameter class
55 Growing stock in the Northern Cumberland Unit, by species and diameter class
56 Growing stock in the Southern Cumberland Unit, by species and diameter class
57 Growing stock in the Eastern Unit, by species and diameter class
58 Sawtimber in the Western Unit, by species and diameter class
59 Sawtimber in the Western Coalfield Unit, by species and diameter class
60 Sawtimber in the Pennyroyal Unit, by species and diameter class
61 Sawtimber in the Bluegrass Unit, by species and diameter class
62 Sawtimber in the Northern Cumberland Unit, by species and diameter class
63 Sawtimber in the Southern Cumberland Unit, by species and diameter class
64 Sawtimber in the Eastern Unit, by species and diameter class
65 Sawtimber in the Western Unit, by species and quality class
66 Sawtimber in the Western Coalfield Unit, by species and quality class
67 Sawtimber in the Pennyroyal Unit, by species and quality class
68 Sawtimber in the Bluegrass Unit, by species and quality class
69 Sawtimber in the Northern Cumberland Unit, by species and quality class
70 Sawtimber in the Southern Cumberland Unit, by species and quality class
71 Sawtimber in the Eastern Unit, by species and quality class

GROWTH AND REMOVALS

72 Annual net growth and removals of growing stock and sawtimber, by geographic unit

COUNTY DATA

73 Area by land class, county, and geographic unit
74 Growing stock and sawtimber, by county and geographic unit

Table 1.—Area by land class, Kentucky, 1975

Land class	Area	
	Thousand acres	*Percent*
Forest land		
Commercial	11,901.9	47
Productive reserved	212.8	1
Unproductive	46.1	([a])
Total forest land	12,160.8	48
Nonforest land		
Cropland [b]	4,527.9	18
Pasture [b]	6,774.9	26
Other [c]	2,041.2	8
Total nonforest land	13,344.0	52
Total area [d]	25,504.8	100

[a] Less than 0.5 percent.
[b] Census of Agriculture 1969.
[c] Includes swampland, industrial and urban areas, other nonforest lands, and 50,550 acres, classed as water by Forest Survey standards, but defined by the Bureau of the Census as land.
[d] Source: United States Bureau of the Census, Area of Kentucky, 1960 (July 1964).

Table 2.—Area of commercial forest land, by ownership class, Kentucky, 1975

Ownership class	Area	
	Thousand acres	*Percent*
National forest	588.8	5
Other Federal	229.9	2
State	76.0	1
County and municipal	.6	([a])
Total public	895.3	8
Forest industry	255.1	2
Farmer-owned	5,489.0	46
Miscellaneous private:		
Individual	4,431.8	37
Corporate	830.7	7
Total private	11,006.6	92
All ownerships	11,901.9	100

[a] Less than 0.5 percent.

Table 3.—Area of commercial forest land, by stand-size and ownership class, Kentucky, 1975

(In thousands of acres)

Stand-size class	All ownerships	National forest	Other public	Forest industry	Farmer and other
Sawtimber stands	5,544.3	413.1	115.8	71.9	4,943.5
Poletimber stands	3,006.1	148.2	120.5	150.5	2,586.9
Sapling-seedling stands	3,305.3	27.5	70.2	32.7	3,174.9
Nonstocked areas	46.2	—	—	—	46.2
All classes	11,901.9	588.8	306.5	255.1	10,751.5

Table 4.—Area of commercial forest land, by stand-volume and ownership class, Kentucky, 1975

(In thousands of acres)

Stand-volume per acre (board feet)[a]	All ownerships	National forest	Other public	Forest industry	Farmer and other
Less than 1,500	4,391.1	84.7	127.9	74.3	4,104.2
1,500 to 5,000	5,602.5	374.8	161.6	159.4	4,906.7
More than 5,000	1,908.3	129.3	17.0	21.4	1,740.6
All classes	11,901.9	588.8	306.5	255.1	10.751.5

[a] International ¼-inch rule.

Table 5.—Area of commercial forest land, by stocking class based on selected stand components, Kentucky, 1975

(In thousands of acres)

Stocking class[a] (percent)	Stocking classified in terms of—				
		Growing-stock trees			Rough and rotten trees
	All trees	Total	Desirable	Acceptable	
160	14.9	—	—	—	—
150 to 159	161.2	36.5	—	36.5	—
140 to 149	601.3	90.1	—	59.5	—
130 to 139	2,002.8	299.8	—	264.8	—
Overstocked	2,780.2	426.4	—	360.8	—
120 to 129	2,505.5	894.3	—	728.8	—
110 to 119	2,763.7	1,457.7	—	1,323.9	—
100 to 109	1,786.9	2,209.6	—	2,121.7	—
Fully stocked	7,056.1	4,561.6	—	4,174.4	—
90 to 99	1,114.8	2,209.3	—	2,318.8	28.2
80 to 89	376.1	1,766.7	—	1,861.3	11.8
70 to 79	267.8	1,126.1	—	1,235.0	61.4
60 to 69	85.2	811.9	12.5	863.9	130.1
Medium stocked	1,843.9	5,914.0	12.5	6,279.0	231.5
50 to 59	54.6	491.7	—	554.2	443.9
40 to 49	47.4	222.6	—	247.9	978.5
30 to 39	65.8	157.8	12.5	157.8	1,556.4
20 to 29	42.1	81.7	140.6	81.7	2,821.0
10 to 19	11.8	12.5	800.3	—	3,388.6
0 to 9	—	33.6	10,936.0	46.1	2,482.0
Poorly stocked	221.7	999.9	11,889.4	1,087.7	11,670.4
All classes	11,901.9	11,901.9	11,901.9	11,901.9	11,901.9

[a] 100 percent stocking equals 75 square feet of basal area per acre.

Table 6.—Area of commercial forest land, by area-condition and ownership class, Kentucky, 1975

(In thousands of acres)

Area-condition class[a]	All ownerships	National forest	Other public	Forest industry	Farmer and other
Class *10-50*	4,320.9	364.4	145.3	46.0	3,765.2
Class *60*	6,465.7	201.5	136.5	198.6	5,929.1
Class *70*	1,115.3	22.9	24.7	10.5	1,057.2
All classes	11,901.9	588.8	306.5	255.1	10,751.5

[a] Class *10-40.*—Areas medium to fully stocked with desirable trees.

Class *50.*—Areas poorly stocked with desirable trees, but fully stocked with growing- stock trees.

Class *60.*—Areas poorly stocked with desirable trees, but with medium to full stocking of growing-stock trees.

Class *70.*—Areas poorly stocked with desirable trees, and poorly stocked with growing-stock trees.

Table 7.—Area of commercial forest land, by potential site productivity and ownership class, Kentucky, 1975

(In thousands of acres)

Growth-per-acre class (cubic feet)	All ownerships	National forest	Other public	Forest industry	Farmer and other
120 to 165	922.7	25.7	9.1	—	887.9
85 to 120	3,043.7	241.0	30.2	53.7	2,718.8
50 to 85	4,945.6	194.8	160.6	163.9	4,426.3
Less than 50	2,989.9	127.3	106.6	37.5	2,718.5
All classes	11,901.9	588.8	306.5	255.1	10,751.5

Table 8.—Area of commercial forest land, by forest type group and ownership class, Kentucky, 1975

(In thousands of acres)

Forest type group	All ownerships	National forest	Other public	Forest industry	Farmer and other
White and red pine	38.2	15.2	—	—	23.0
Loblolly and shortleaf pine	942.8	44.1	9.1	—	889.6
Oak/pine	1,040.6	85.8	15.3	—	939.5
Oak/hickory	7,488.5	360.7	248.4	225.3	6,654.1
Oak/gum	101.6	—	—	—	101.6
Elm/ash/red maple	936.0	7.7	24.7	—	903.6
Maple/beech/birch	1,354.2	75.3	9.0	29.8	1,240.1
All types	11,901.9	588.8	306.5	255.1	10,751.5

Table 9.—Area of commercial forest land, by forest type group and stand-size class, Kentucky, 1975

(In thousands of acres)

Forest type group	All stands	Sawtimber stands	Poletimber stands	Sapling-seedling stands[a]
White and red pine	38.2	38.2	—	—
Loblolly and shortleaf pine	942.8	281.4	157.6	503.8
Oak/pine	1,040.6	335.8	215.6	489.2
Oak/hickory	7,488.5	3,622.6	2,183.3	1,682.6
Oak/gum	101.6	57.6	19.2	24.8
Elm/ash/red maple	936.0	288.0	212.9	435.1
Maple/beech/birch	1,354.2	920.7	217.5	216.0
All types	11,901.9	5,544.3	3,006.1	3,351.5

[a] Includes 46,200 acres of nonstocked areas in the oak/hickory type group.

Table 10.—Area of commercial forest land by forest type and forest type group, Kentucky 1975

(In thousands of acres)

Forest type and forest type group	Area	Sampling error
	Thousand acres	*Percent*
Hemlock	38.2	*
TOTAL WHITE AND RED PINE	38.2	*
Shortleaf pine	167.7	26
Virginia pine	299.2	20
Eastern redcedar	428.1	15
Pitch pine	47.8	*
TOTAL LOBLOLLY AND SHORTLEAF PINE	942.8	10
Eastern redcedar/hardwood	470.5	16
Virginia pine/southern red oak	282.2	20
Shortleaf pine/oak	183.3	25
Other oak/pine	104.6	33
TOTAL OAK/PINE	1,040.6	10
Post, black, or bear oak	673.6	13
Chestnut oak	754.6	12
White oak/red oak/hickory	1,947.3	7
White oak	564.9	14
Northern red oak	49.9	*
Yellow-poplar/white oak/northern red oak	519.8	15
Sweetgum/yellow-poplar	918.8	11
Mixed hardwoods	2,059.6	8
TOTAL OAK/HICKORY	7,488.5	3
Swamp chestnut and cherrybark oak	25.8	*
Sweetbay/swamp tupelo/red maple	75.8	41
TOTAL OAK/GUM	101.6	34
Black ash/American elm/red maple	789.3	12
River birch/sycamore	113.1	32
Willow	33.6	*
TOTAL ELM/ASH/RED MAPLE	936.0	11
Sugar maple/beech/yellow birch	1,316.6	9
Black cherry	23.0	*
Black walnut	14.6	**
TOTAL MAPLE/BEECH/BIRCH	1,354.2	9
All types	11,901.9	0.5

* Sampling error of 50 to 99 percent.
** Sampling error of more than 99 percent.

Table 11.—Area of noncommercial forest land, by forest type group, Kentucky, 1975

(In thousands of acres)

Forest type group	All areas	Productive-reserved areas	Unproductive areas
Loblolly and shortleaf pine	12.8	12.8	—
Oak/pine	27.5	.6	26.9
Oak/hickory	192.5	175.8	16.7
Elm/ash/red maple	13.3	10.8	2.5
Maple/beech/birch	12.8	12.8	—
All types	258.9	212.8	46.1

Table 12.—Number of trees on commercial forest land by species group, tree class, and diameter class, Kentucky, 1975

(In thousands of trees)

Dbh class (inches)	Softwoods			Hardwoods		
	Growing-stock trees	Rough and rotten trees	Total	Growing-stock trees	Rough and rotten trees	Total
Poletimber						
5.0 to 6.9	60,317	9,318	69,635	408,879	117,006	525,885
7.0 to 8.9	36,255	3,567	39,822	245,099	39,287	284,386
9.0 to 10.9	—	—	—	169,082	19,115	188,197
Total	96,572	12,885	109,457	823,060	175,408	998,468
Small sawtimber						
9.0 to 10.9	22,382	2,769	25,151	—	—	—
11.0 to 12.9	11,459	1,028	12,487	100,351	11,609	111,960
13.0 to 14.9	4,252	270	4,522	65,600	5,625	71,225
Total	38,093	4,067	42,160	165,951	17,234	183,185
Large sawtimber						
15.0 to 16.9	1,950	284	2,234	40,050	3,947	43,997
17.0 to 18.9	544	121	665	21,816	3,077	24,893
19.0 to 20.9	278	—	278	10,788	1,967	12,755
21.0 to 28.9	192	20	212	12,312	3,584	15,896
29.0 and larger	17	—	17	1,341	864	2,205
Total	2,981	425	3,406	86,307	13,439	99,746
All classes	137,646	17,377	155,023	1,075,318	206,081	1,281,399

Table 13.—Number of growing-stock trees on commercial forest land, by species and diameter class, Kentucky, 1975

(In thousands of trees)

Species	All classes	Diameter class (inches at breast height) 5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Redcedar	30,952	20,562	7,026	2,003	708	367	190	96	—	—	—
Hard pines	100,357	38,267	27,845	18,780	10,076	3,512	1,453	305	78	41	—
Other softwoods	6,337	1,488	1,384	1,599	675	373	307	143	200	151	17
Total softwoods	137,646	60,317	36,255	22,382	11,459	4,252	1,950	544	278	192	17
Select white oaks	143,974	50,879	31,386	24,016	15,732	9,502	6,740	3,226	964	1,463	66
Select red oaks	44,175	11,803	9,159	6,650	4,881	3,697	3,181	1,714	1,192	1,808	90
Other white oaks	97,117	29,484	22,115	17,633	10,707	7,404	4,411	2,468	1,302	1,291	302
Other red oaks	142,204	42,448	31,445	23,317	15,450	12,090	8,311	4,469	2,164	2,258	252
Red maple	56,938	30,542	12,760	5,794	2,851	2,370	1,246	533	445	303	94
Sugar maple	50,899	21,130	13,110	7,496	3,776	2,342	1,656	784	262	342	1
Hickory	179,445	76,884	40,373	30,296	14,026	9,432	4,172	2,384	943	882	53
Beech	28,085	6,884	6,175	3,849	2,764	2,231	1,771	1,403	1,019	1,725	264
Ash	43,313	15,428	12,028	7,444	4,021	2,132	1,158	536	270	278	18
Black walnut	19,271	8,245	4,939	2,573	1,852	1,002	474	67	55	64	—
Sweetgum	13,739	4,657	3,644	2,415	1,601	861	304	100	90	67	—
Yellow-poplar	97,814	32,075	22,856	17,581	10,454	7,133	3,740	2,028	948	905	94
Blackgum	22,591	8,430	5,321	3,013	2,697	1,560	695	550	200	125	—
Basswood	11,837	6,154	1,886	1,253	1,184	486	405	250	146	73	—
Other hardwoods	123,916	63,836	27,902	15,752	8,355	3,358	1,786	1,304	788	728	107
Total hardwoods	1,075,318	408,879	245,099	169,082	100,351	65,600	40,050	21,816	10,788	12,312	1,341
All species	1,212,964	469,196	281,354	191,464	111,810	69,852	42,000	22,360	11,066	12,504	1,358

Table 14.—Net volume of timber on commercial forest land, by class of timber, softwoods, and hardwoods, Kentucky, 1975

(In millions of cubic feet)

Class of timber	All species	Softwoods	Hardwoods
Sawtimber trees			
Sawlog portion	5,729.2	479.0	5,250.2
Upper-stem portion	1,283.8	70.2	1,213.6
All sawtimber trees	7,013.0	549.2	6,463.8
Poletimber trees	4,430.7	313.3	4,117.4
All growing-stock trees	11,443.7	862.5	10,581.2
Rough trees	742.7	96.5	646.2
Rotten trees	427.6	3.9	423.7
All trees	12,614.0	962.9	11,651.1

Table 15.—Net volume of growing stock and sawtimber on commercial forest land, by ownership class, stand-size class, softwoods, and hardwoods, Kentucky, 1975

Ownership or stand-size class	Growing stock (million cubic feet)			Sawtimber (million board feet)[a]		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
			BY OWNERSHIP CLASS			
ational forest	744.0	144.2	599.8	1,907.5	411.6	1,495.9
ther public	339.3	3.3	336.0	686.5	7.5	679.0
orest industry	236.8	6.0	230.8	542.9	14.0	528.9
armer and other	10,123.6	709.0	9,414.6	24,415.0	1,533.9	22,881.1
All ownerships	11,443.7	862.5	10,581.2	27,551.9	1,967.0	25,584.9
			BY STAND-SIZE CLASS			
awtimber stands	7,336.6	552.8	6,783.8	21,282.4	1,490.4	19,792.0
oletimber stands	2,959.9	176.4	2,783.5	4,345.8	296.4	4,049.4
apling-seedling stands	1,145.3	133.3	1,012.0	1,920.3	180.2	1,740.1
onstocked areas	1.9	—	1.9	3.4	—	3.4
All classes	11,443.7	862.5	10,581.2	27,551.9	1,967.0	25,584.9

[a]International ¼-inch rule.

Table 16.—Net volume of growing stock and sawtimber on commercial forest land, by forest type group, and softwoods and hardwoods, Kentucky, 1975

Forest type group	Growing stock (million cubic feet)			Sawtimber (million board feet)[a]		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
White and red pine	52.9	28.4	24.5	127.6	98.7	28.9
Loblolly and shortleaf pine	570.3	386.2	184.1	1,098.5	777.0	321.5
Oak/pine	756.3	221.4	534.9	1,671.7	550.4	1,121.3
Oak/hickory	7,874.0	170.7	7,703.3	18,932.7	399.0	18,533.7
Oak/gum	114.8	—	114.8	317.4	—	317.4
Elm/ash/red maple	695.6	29.7	665.9	1,554.3	78.7	1,475.6
Maple/beech/birch	1,379.8	26.1	1,353.7	3,849.7	63.2	3,786.5
All types	11,443.7	862.5	10,581.2	27,551.9	1,967.0	25,584.9

[a]International ¼-inch rule.

Table 17.—Net volume of growing stock on commercial forest land, by species and diameter class, Kentucky, 1975

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)								
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9
Redcedar	116.1	51.7	31.2	13.8	7.2	5.6	4.0	2.6	—	—
Hard pines	661.2	82.9	133.6	169.3	145.0	73.4	41.4	12.0	3.6	—
Other softwoods	85.2	5.6	8.3	17.1	9.5	7.8	8.5	5.4	8.6	12.8
Total softwoods	862.5	140.2	173.1	200.2	161.7	86.8	53.9	20.0	12.2	12.8
Select white oaks	1,519.0	142.3	172.1	234.5	248.1	221.2	217.0	130.9	50.6	96.4
Select red oaks	652.5	35.5	51.7	63.6	74.2	82.0	97.4	62.6	56.3	118.2
Other white oaks	1,081.3	91.4	119.8	166.6	165.5	162.8	126.4	90.6	58.1	68.8
Other red oaks	1,744.6	129.7	178.5	224.9	236.3	272.7	250.9	174.7	102.9	145.1
Red maple	409.8	90.5	68.8	53.7	39.9	48.2	36.3	21.2	20.1	19.0
Sugar maple	441.4	73.9	77.2	71.0	58.1	48.3	49.7	32.3	11.8	19.1
Hickory	1,496.0	214.9	217.2	292.9	221.0	209.9	134.8	97.0	45.9	56.5
Beech	486.2	21.8	32.8	38.0	43.8	51.0	54.4	54.6	49.1	113.3
Ash	335.9	43.6	55.9	63.0	54.8	41.4	32.3	18.9	9.8	14.7
Black walnut	124.9	17.8	21.8	21.3	25.5	19.2	12.1	2.2	1.9	3.1
Sweetgum	130.0	14.8	20.0	25.6	27.5	18.3	10.4	3.9	4.6	4.9
Yellow-poplar	1,007.9	103.8	129.6	169.1	155.2	147.4	109.4	77.1	47.8	58.9
Blackgum	221.1	25.3	31.0	29.9	41.9	33.5	21.6	21.1	9.3	7.5
Basswood	107.4	17.1	11.3	14.8	18.1	11.4	12.1	9.4	7.3	5.9
Other hardwoods	823.2	163.4	138.5	136.5	118.2	72.5	53.1	46.3	36.7	44.7
Total hardwoods	10,581.2	1,185.8	1,326.2	1,605.4	1,528.1	1,439.8	1,217.9	842.8	512.2	776.1
All species	11,443.7	1,326.0	1,499.3	1,805.6	1,689.8	1,526.6	1,217.8	862.8	524.4	788.9

Table 18.—Net volume of sawtimber on commercial forest land, by species and diameter class, Kentucky, 1975

(In millions of board feet)[a]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0
Redcedar	116.2	46.0	25.2	18.6	16.6	9.8	—	—	—
Hard pines	1,577.9	543.9	529.8	276.6	162.6	49.7	15.3	—	—
Other softwoods	272.9	57.6	33.0	29.6	33.3	22.0	35.3	56.0	6.1
Total softwoods	1,967.0	647.5	588.0	324.8	212.5	81.5	50.6	56.0	6.1
Select white oaks	3,807.0	—	839.4	831.4	876.0	557.9	220.7	452.3	29.3
Select red oaks	2,055.4	—	249.3	307.1	387.8	262.6	245.0	551.2	52.4
Other white oaks	2,775.4	—	550.2	605.0	505.2	379.2	251.5	340.2	144.1
Other red oaks	4,832.2	—	793.0	1,021.7	999.4	737.8	451.2	689.5	139.6
Red maple	768.5	—	132.5	179.5	143.0	85.1	85.9	86.8	55.7
Sugar maple	848.6	—	192.1	184.5	198.0	134.1	51.3	88.3	.3
Hickory	2,991.3	—	741.9	791.8	541.4	411.4	202.1	274.7	28.0
Beech	1,677.9	—	146.1	190.3	217.8	229.1	217.5	545.3	131.8
Ash	660.6	—	182.0	154.6	127.9	78.6	42.9	67.3	7.3
Black walnut	237.7	—	84.9	72.9	48.1	9.4	8.5	13.9	—
Sweetgum	265.0	—	91.5	70.3	43.1	16.8	21.2	22.1	—
Yellow-poplar	2,389.9	—	526.8	558.2	441.8	328.4	206.5	283.0	45.2
Blackgum	515.9	—	139.3	123.7	86.1	90.6	41.2	35.0	—
Basswood	254.8	—	62.1	42.5	49.2	40.7	32.4	27.8	—
Other hardwoods	1,504.8	—	393.9	270.5	213.1	196.1	161.7	205.5	64.0
Total hardwoods	25,584.9	—	5,125.0	5,404.0	4,877.9	3,557.8	2,239.6	3,682.9	697.7
All species	27,551.9	647.5	5,713.0	5,728.8	5,090.4	3,639.3	2,290.2	3,738.9	703.8

[a] International ¼-inch rule.

Table 19.—Net volume of sawtimber on commercial forest land, by species and quality class, Kentucky, 1975

(In millions of board feet)[a]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[b]
Softwoods					
Hard pines	1,577.9	93.5	177.0	1,307.4	—
Other softwoods[c]	389.1	—	—	—	—
Total softwoods	1,967.0	93.5	177.0	1,307.4	—
Hardwoods					
Select white oaks	3,807.0	404.0	735.0	2,040.5	627.5
Select red oaks	2,055.4	375.9	523.4	859.7	296.4
Other white oaks	2,775.4	327.4	446.4	1,430.9	570.5
Other red oaks	4,832.2	663.2	838.3	2,401.4	929.3
Red maple	768.5	59.8	142.0	366.4	200.3
Sugar maple	848.6	97.5	135.6	407.3	208.2
Hickory	2,991.3	321.3	540.6	1,600.3	529.1
Beech	1,677.9	26.3	102.9	928.2	620.5
Ash	660.6	80.7	169.0	258.2	152.7
Black walnut	237.7	24.0	52.2	139.9	21.6
Sweetgum	265.0	27.9	45.3	157.9	33.9
Yellow-poplar	2,389.9	351.5	401.6	945.6	691.2
Blackgum	515.9	70.3	100.1	284.8	60.7
Basswood	254.7	28.2	33.9	172.2	20.4
Other hardwoods	1,504.8	149.5	271.6	813.8	269.9
Total hardwoods	25,584.9	3,007.5	4,538.1	12,807.1	5,232.2
Hardwood quality (%)	100	12	18	50	20

[a] International ¼-inch rule.
[b] This applies only to hardwoods and is construction grade material.
[c] Species other than pine are not graded into standard lumber grades.

Table 20.—Components of average annual change of growing stock and sawtimber on commercial forest land, softwoods and hardwoods, Kentucky, 1962-74

Components	All species	Softwoods	Hardwoods
		GROWING STOCK	
		Thousand cubic feet	
Gross growth[a]	410,243	37,968	372,275
Cull increment	− 30,536	− 1,879	− 28,657
Annual mortality	− 60,357	− 3,548	− 56,809
Average annual:			
Net growth	319,350	32,541	286,809
Removals	− 138,575	− 11,750	− 127,825
Inventory change	179,775	20,791	158,984
		SAWTIMBER	
		Thousand board feet[b]	
Gross growth[a]	1,123,794	80,330	1,043,464
Cull increment	− 91,881	− 3,231	− 88,650
Annual mortality	− 137,496	− 3,876	− 133,620
Average annual:			
Net growth	894,417	73,223	821,194
Removals	− 452,918	− 27,057	− 425,861
Inventory change	441,499	46,166	395,333

[a] Includes growth on trees that were cut.
[b] International ¼-inch rule.

Table 21.—Annual net growth, removals, and mortality of growing stock and sawtimber on commercial forest land, by species, Kentucky, 1974

Species	Growing stock			Sawtimber		
	Annual net growth	Annual timber removals[a]	Annual mortality	Annual net growth	Annual timber removals[a]	Annual mortality
	Thousand cubic feet			*Thousand board feet*[b]		
Softwoods						
Hard pines	30,296	11,072	3,136	66,248	28,671	6,799
Other softwoods	7,504	528	964	11,752	1,329	2,201
Total softwoods	37,800	11,600	4,100	78,000	30,000	9,000
Hardwoods						
Select white oaks	62,658	32,163	2,060	163,128	101,475	2,444
Select red oaks	27,439	5,163	2,624	84,961	19,300	5,839
Other white oaks	32,566	3,777	2,058	86,291	11,194	3,809
Other red oaks	43,316	38,534	7,902	146,359	139,653	13,301
Maples	29,385	4,065	1,425	63,197	11,493	1,749
Hickory	41,442	10,588	5,143	78,815	30,258	6,699
Beech	12,800	2,416	2,647	56,478	10,313	10,943
Yellow-poplar	46,004	21,601	1,130	80,374	64,715	876
Other hardwoods	57,990	18,993	11,611	115,397	44,599	13,340
Total hardwoods	353,600	137,300	36,600	875,000	433,000	59,000
All species	391,400	148,900	40,700	953,000	463,000	68,000

[a] Data for timber removals in this table are based on the trend from 1962 through 1974 and differ from those shown in Table 27. Table 27 reports results of a canvass of timber removals for 1974.
[b] International ¼-inch rule.

Table 22.—Annual net growth and removals of growing stock and sawtimber on commercial forest land, by ownership class, and softwoods and hardwood, Kentucky, 1974

Ownership class	Annual net growth			Annual timber removals[a]		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwood
			GROWING STOCK			
			Thousand cubic feet			
National forest	26,363	6,319	20,044	8,121	3,851	4,270
Other public	11,373	145	11,228	2,894	24	2,870
Forest industry	7,976	263	7,713	576	—	576
Farmer and other	345,688	31,073	314,615	137,309	7,725	129,584
All ownerships	391,400	37,800	353,600	148,900	11,600	137,300
			SAWTIMBER			
			Thousand board feet[b]			
National forest	67,481	16,321	51,160	30,507	13,793	16,714
Other public	23,520	298	23,222	11,389	88	11,301
Forest industry	18,643	555	18,088	2,382	—	2,382
Farmer and other	843,356	60,826	782,530	418,722	16,119	402,603
All ownerships	953,000	78,000	875,000	463,000	30,000	433,000

[a] Data for timber removals in this table are based on the trend from 1962 through 1974 and differ from those shown in Tat 27. Table 27 reports results of a canvass of timber removals nor 1974.
[b] International ¼-inch rule.

Table 23.—Annual mortality of growing stock and sawtimber on commercial forest land, by ownership class, cause, and softwoods and hardwoods, Kentucky, 1974

Ownership class and cause	Growing stock (thousand cubic feet)			Sawtimber (thousand board feet)[a]		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
			BY OWNERSHIP CLASS			
ational forest	2,760	685	2,075	5,332	1,883	3,449
ther public	1,177	15	1,162	1,600	34	1,566
orest industry	827	29	798	1,283	63	1,220
armer and other	35,936	3,371	32,565	59,785	7,020	52,765
All ownerships	40,700	4,100	36,600	68,000	9,000	59,000
			BY CAUSE			
re	734	—	734	603	—	603
sects	58	—	58	—	—	—
isease	5,868	479	5,389	8,613	2,219	6,394
ther	4,385	1,041	3,344	9,557	3,588	5,969
nknown	29,655	2,580	27,075	49,227	3,193	46,034
All causes	40,700	4,100	36,600	68,000	9,000	59,000

[a] International ¼-inch rule.

Table 24.—Sampling errors for major forest-area and timber-volume classes, Kentucky 1975

able o.	Item classification	Sampling error
	FOREST AREA	*Percent*
1	Forest-land area	
	Commercial	0.5
	Unproductive	50.3
	Total	0.6
2	Ownership class[a]	
	Forest industry	26
	Farmer-owned	4
	Misc. private-individual	4
	Misc. private-corporate	12
3	Stand-size class	
	Sawtimber	3
	Poletimber	5
	Sapling-seedling	5
	Nonstocked areas	*
4	Stand-volume per acre (board feet)	
	Less than 1,500	4
	1,500 to 5,000	3
	More than 5,000	7
5	Stocking class (in percent)	*Percent*
		All trees / *Growing stock*
	160	* / —
	150 to 159	27 / *
	140 to 149	14 / 36
	130 to 139	7 / 20
	Overstocked	6 / 17
	120 to 129	6 / 11
	110 to 119	6 / 8
	100 to 109	8 / 7
	Fully stocked	4 / 5
	90 to 99	10 / 7
	80 to 89	18 / 8
	70 to 79	21 / 10
	60 to 69	38 / 12
	Medium stocked	8 / 4
	50 to 59	45 / 16
	40 to 49	46 / 23
	30 to 39	45 / 28
	20 to 29	* / 49
	10 to 19	* / **
	0 to 9	— / *
	Poorly stocked	25 / 11

Table no.	Item classification	Sampling error
		Percent
6	Area-condition class	
	10 to *50*	4
	60	3
	70	10
7	Growth-per-acre class (cubic feet)	
	120 to 165	11
	85 to 120	5
	50 to 85	4
	Less than 50	6
	NUMBER OF TREES	
		Percent
		Soft-woods / *Hard-woods*
12	Growing-stock trees (dbh class)	
	5.0 to 6.9	9 / 3
	7.0 to 8.9	11 / 3
	9.0 to 10.9	— / 3
	Poletimber	7 / 2
	9.0 to 10.9	11 / —
	11.0 to 12.9	11 / 4
	13.0 to 14.9	15 / 4
	Small sawtimber	8 / 3
	15.0 to 16.9	16 / 5
	17.0 to 18.9	23 / 5
	19.0 to 20.9	32 / 6
	21.0 to 28.9	33 / 5
	29.0 and larger	* / 12
	Large sawtimber	12 / 3
	All classes	6 / 2
13	Species	*Percent*
	Redcedar	13
	Hard pines	10
	Other softwoods	23
	Select white oaks	5
	Select red oaks	8
	Other white oaks	7
	Other red oaks	5
	Red maple	8

CONTINUED

Table 24.—Continued

Table no.	Item classification	Sampling error	
	Sugar maple	9	
	Hickory	5	
	Beech	11	
	Ash	9	
	Black walnut	11	
	Sweetgum	17	
	Yellow-poplar	7	
	Blackgum	10	
	Basswood	20	
	Other hardwoods	6	
	All species	1.8	
	TIMBER VOLUME	*Percent*	
		Cubic feet	*Board feet*
14	Class of timber		
	Sawtimber trees	2	—
	Poletimber trees	2	—
	All growing stock	1	—
	Rough trees	5	—
	Rotten trees	5	—
	All live trees	1	—
15	Ownership and stand-size		
	National forest	15	16
	Other public	20	23
	Forest industry	27	32
	Farmer and other	2	2
	Sawtimber	3	2
	Poletimber	6	7
	Sapling-seedling	7	9
	Nonstocked areas	**	**
16	Forest type		
	White and red pine	*	*
	Loblolly and shortleaf	13	15
	Oak/pine	12	14
	Oak/hickory	3	3
	Oak/gum/cypress	37	44
	Elm/ash/cottonwood	14	15
	Maple/beech/birch	10	10
17-18	Diameter class (inches)		
	5.0 to 6.9	3	—
	7.0 to 8.9	3	—
	9.0 to 10.9[b]	3	11
	11.0 to 12.9	3	3
	13.0 to 14.9	3	3
	15.0 to 16.9	3	3
	17.0 to 18.9	4	4
	19.0 to 20.9	5	5
	21.0 to 28.9	5	5
	29.0 and larger	11	11

Table no.	Item classification	Sampling error	
17-18	Species		
	Redcedar	13	27
	Hard pines	9	10
	Other softwoods	23	24
	All softwoods	8	9
	Select white oaks	5	6
	Select red oaks	7	7
	Other white oaks	7	8
	Other red oaks	4	5
	Red maple	8	12
	Sugar maple	8	11
	Hickory	4	6
	Beech	10	11
	Ash	8	11
	Black walnut	11	14
	Sweetgum	14	18
	Yellow-poplar	7	8
	Blackgum	10	13
	Basswood	17	20
	Other hardwoods	5	8
	All hardwoods	1	2
	All species	1.1	1.5
	GROWTH-REMOVALS		
		Percent	
		Cubic feet	*Board feet*
20	Components of change		
	Gross growth	3	3
	Cull increment	7	11
	Annual mortality	7	11
	Annual net growth	4	4
	Annual removals	8	9
	Inventory change	10	12
22	Growth by		
	Softwoods	14	17
	Hardwoods	4	5
22	Removals by		
	Softwoods	26	32
	Hardwoods	8	9
	MORTALITY		
		Percent	
		Cubic feet	*Board feet*
23	Species group		
	Softwoods	22	30
	Hardwoods	8	11
23	Cause		
	Fire	*	*
	Insect	*	—
	Disease	14	24
	Other	30	32
	Unknown	7	13

* Sampling errors of 50 to 99 percent.
**Sampling errors of over 100 percent.
[a] Public ownership classes have no sampling errors.
[b] Board-foot sampling error for this class is for softwoods only.

Table 25.—Output of timber products, by source of material, softwoods and hardwoods, Kentucky, 1974

Product and species group	Standard units	Total output		Output from roundwood		Output from plant byproducts	
		Number of units	Thousand cubic feet	Number of units	Thousand cubic feet	Number of units	Thousand cubic feet
awlogs							
Softwood	M bd. ft.[a]	32,292	5,771	32,292	5,771	—	—
Hardwood	M bd. ft.[a]	456,502	66,658	456,502	66,658	—	—
Total	M bd. ft.[a]	488,794	72,429	488,794	72,429	—	—
neer logs and bolts							
Softwood	M bd. ft.[a]	—	—	—	—	—	—
Hardwood	M bd. ft.[a]	6,332	853	6,332	853	—	—
Total	M bd. ft.[a]	6,332	853	6,332	853	—	—
ulpwood							
Softwood	Std. cords[b]	33,700	2,865	24,800	2,108	8,900	712
Hardwood	Std. cords[b]	362,700	30,829	108,300	9,205	254,400	20,352
Total	Std. cords[b]	396,400	33,694	133,100	11,313	263,300	21,064
ooperage logs and bolts							
Softwood	M bd. ft.[a]	—	—	—	—	—	—
Hardwood	M bd. ft.[a]	12,159	1,733	12,159	1,733	—	—
Total	M bd. ft.[a]	12,159	1,733	12,159	1,733	—	—
oles							
Softwood	M pieces	6	60	6	60	—	—
Hardwood	M pieces	—	—	—	—	—	—
Total	M pieces	6	60	6	60	—	—
osts (round and split)							
Softwood	M pieces	734	1,577	734	1,577	—	—
Hardwood	M pieces	10	21	10	21	—	—
Total	M pieces	744	1,598	744	1,598	—	—
ine timbers (round)							
Softwood	M cu. ft.	428	428	428	428	—	—
Hardwood	M cu. ft.	4,823	4,823	4,823	4,823	—	—
Total	M cu. ft.	5,251	5,251	5,251	5,251	—	—
ther[c]							
Softwood	M cu. ft.	3,386	3,386	1,718	1,718	1,668	1,668
Hardwood	M cu. ft.	6,096	6,096	3,112	3,112	2,984	2,984
Total	M cu. ft.	9,482	9,482	4,830	4,830	4,652	4,652
otal industrial products							
Softwood	M cu. ft.		14,042		11,662		2,380
Hardwood	M cu. ft.		109,741		86,405		23,336
Total	M cu. ft.		123,783		98,067		25,716
uelwood							
Softwood	Std. cords	4,487	359	—	—	4,487	359
Hardwood	Std. cords	138,475	11,078	116,275	9,302	22,200	1,776
Total	Std. cords	142,962	11,437	116,275	9,302	26,687	2,135
ll products[d]							
Softwood	M cu. ft.		14,401		11,662		2,739
Hardwood	M cu. ft.		120,819		95,707		25,112
Total	M cu. ft.		135,220		107,369		27,851

[a] International ¼-inch rule.
[b] Rough wood basis, includes chips converted to equivalent standard cords.
[c] Includes charcoal, flakeboard, handle stock, dimension, and metallurgical chips.
[d] Does not include 136,000 cubic feet of softwood and 1,053,000 cubic feet of hardwood residues used for agricultural bedding.

Table 26.—Output of roundwood products, by source, softwoods and hardwoods, Kentucky, 1974

(In thousands of cubic feet)

Product and species group	All sources	Growing-stock trees[a]			Rough and rotten trees[a]	Salvable dead trees[a]	Other sources[b]
		Total	Sawtimber	Poletimber			
PRINCIPAL INDUSTRIAL PRODUCTS							
Sawlogs							
Softwood	5,771	4,543	4,518	25	—	882	346
Hardwood	66,658	63,110	63,019	91	—	680	2,868
Total	72,429	67,653	67,537	116	—	1,562	3,214
Veneer logs and bolts							
Softwood	—	—	—	—	—	—	—
Hardwood	853	853	853	—	—	—	—
Total	853	853	853	—	—	—	—
Pulpwood							
Softwood	2,108	1,583	872	711	—	21	504
Hardwood	9,205	7,537	5,438	2,099	792	—	876
Total	11,313	9,120	6,310	2,810	792	21	1,380
MISCELLANEOUS INDUSTRIAL PRODUCTS							
Cooperage logs and bolts							
Softwood	—	—	—	—	—	—	—
Hardwood	1,733	1,733	1,733	—	—	—	—
Total	1,733	1,733	1,733	—	—	—	—
Poles							
Softwood	60	60	—	60	—	—	—
Hardwood	—	—	—	—	—	—	—
Total	60	60	—	60	—	—	—
Posts (round and split)							
Softwood	1,577	1,519	142	1,377	28	—	30
Hardwood	21	20	2	18	([c])	—	1
Total	1,598	1,539	144	1,395	28	—	31
Mine timbers (round)							
Softwood	428	412	164	248	—	—	16
Hardwood	4,823	4,645	1,851	2,794	—	—	178
Total	5,251	5,057	2,015	3,042	—	—	194
Other							
Softwood	1,718	967	385	582	13	64	674
Hardwood	3,112	2,119	1,214	905	132	75	786
Total	4,830	3,086	1,599	1,487	145	139	1,460
TOTAL INDUSTRIAL PRODUCTS							
Softwood	11,662	9,084	6,081	3,003	41	967	1,570
Hardwood	86,405	80,017	74,110	5,907	924	755	4,709
Total	98,067	89,101	80,191	8,910	965	1,722	6,279
NONINDUSTRIAL PRODUCTS							
Fuelwood							
Softwood	—	—	—	—	—	—	—
Hardwood	9,302	5,234	2,082	3,152	70	347	3,651
Total	9,302	5,234	2,082	3,152	70	347	3,651
ALL PRODUCTS							
Softwood	11,662	9,084	6,081	3,003	41	967	1,570
Hardwood	95,707	85,251	76,192	9,059	994	1,102	8,360
Total	107,369	94,335	82,273	12,062	1,035	2,069	9,930

[a] On commercial forest land.

[b] Includes trees less than 5.0 inches in diameter, tree tops and limbs from commercial forest areas, or any material from noncommercial forest land or nonforest land such as fence rows and suburban areas.

[c] Negligible amount.

Table 27.—Timber removals from growing stock and sawtimber on commercial forest land, by items, softwoods and hardwoods, Kentucky, 1974

Item	Growing stock			Sawtimber		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
	Thousand cubic feet			*Thousand board feet*[a]		
Roundwood products						
Sawlogs	67,653	4,543	63,110	360,434	20,263	340,171
Veneer logs and bolts	853	—	853	6,332	—	6,332
Pulpwood	9,120	1,583	7,537	23,390	2,838	20,552
Cooperage logs and bolts	1,733	—	1,733	12,159	—	12,159
Poles	60	60	—	—	—	—
Posts	1,539	1,519	20	592	584	8
Mine timbers	5,057	412	4,645	10,728	736	9,992
Other	3,086	967	2,119	8,962	1,727	7,235
Fuelwood	5,234	—	5,234	11,238	—	11,238
All products	94,335	9,084	85,251	433,835	26,148	407,687
Logging residues	25,930	1,163	24,767	37,748	1,361	36,387
Other removals	29,353	2,723	26,630	57,264	2,204	55,060
Total removals	149,618	12,970	136,648	528,847	29,713	499,134

[a] International ¼-inch rule.

Table 28.—Volume of unused residues at primary manufacturing plants, by industry and type of residue, and softwoods and hardwoods, Kentucky, 1974

(In thousands of cubic feet)

Species group and type of residues	All industries	Lumber	Veneer and plywood	Other
Softwoods				
Coarse[a]	157	157	—	—
Fine[b]	330	330	—	—
Total	487	487	—	—
Hardwoods				
Coarse[a]	1,911	1,152	57	702
Fine[b]	8,279	7,913	135	231
Total	10,190	9,065	192	933
All species				
Coarse[a]	2,068	1,309	57	702
Fine[b]	8,609	8,243	135	231
Total	10,677	9,552	192	933

[a] Material, such as slabs, edgings, and veneer cores.
[b] Material, such as sawdust and shavings.

Table 29.—Projection of annual net growth, timber removals, and inventory of growing stock and sawtimber on commercial forest land in Kentucky, 1974-2004[a]

Species group	1974 (inventory year)	1984	1994	2004
		GROWING STOCK		
		Million cubic feet		
Softwoods				
Removals	11.6	18.0	19.3	20.7
Growth	37.8	44.4	53.3	63.9
Inventory	862.5	1,081.3	1,356.2	1,699.5
Hardwoods				
Removal	137.3	142.0	150.7	159.3
Growth	353.6	415.5	498.9	597.3
Inventory	10,581.2	13,259.5	16,629.9	20,840.8
Total				
Removals	148.9	160.0	170.0	180.0
Growth	391.4	459.9	552.2	661.2
Inventory	11,443.7	14,340.8	17,986.1	22,540.3
		SAWTIMBER		
		Million board feet[b]		
Softwoods				
Removals	30.0	32.5	34.9	37.4
Growth	78.0	90.4	106.9	126.3
Inventory	1,967.0	2,424.7	2,994.9	3,701.2
Hardwoods				
Removals	433.0	468.3	503.8	539.1
Growth	875.0	1,013.4	1,198.7	1,416.2
Inventory	25,584.9	31,539.0	38,954.3	48,142.0
Total				
Removals	463.0	500.8	538.7	576.5
Growth	953.0	1,103.8	1,305.6	1,542.5
Inventory	27,551.9	33,963.7	41,949.2	51,843.2

[a] Based upon the following assumptions: The area of commercial forest land will not change significantly. There will be no significant increase in the level of forest management. All forest industries except pulpwood and a yet undeveloped fiber or particle board industry will show little significant growth.

[b] International ¼-inch rule.

Table 30.—Projection of annual net growth, timber removals, and inventory of growing stock and sawtimber on commercial forest land in Kentucky, 1974-2004[a]

Species group	1974 (inventory year)	1984	1994	2004
		GROWING STOCK		
		Million cubic feet		
Softwoods				
Removals	11.6	21.4	32.7	43.2
Growth	37.8	43.0	46.3	46.2
Inventory	862.5	1,039.1	1,160.6	1,201.4
Hardwoods				
Removals	137.3	236.6	335.3	434.8
Growth	353.6	402.2	433.4	431.8
Inventory	10,581.2	12,742.6	14,231.7	14,732.5
Total				
Removals	148.9	258.0	368.0	478.0
Growth	391.4	445.2	479.7	478.0
Inventory	11,443.7	13,781.7	15,392.3	15,933.9
		SAWTIMBER		
		Million board feet[b]		
Softwoods				
Removals	30.0	50.2	72.7	93.0
Growth	78.0	87.7	93.6	93.1
Inventory	1,967.0	2,336.6	2,588.2	2,671.9
Hardwoods				
Removals	433.0	634.8	837.3	1,044.3
Growth	875.0	983.4	1,050.7	1,044.2
Inventory	25,584.9	30,392.2	33,644.4	34,753.3
Total				
Removals	463.0	685.0	910.0	1,137.3
Growth	953.0	1,071.1	1,144.3	1,137.3
Inventory	27,551.9	32,728.8	36,252.6	37,425.2

[a] Based upon the following assumptions: The area of commercial forest land will not change significantly. The level of forest management will be improved sufficiently to bring total growing-stock growth and removals into balance by 2004.

[b] International ¼-inch rule.

Table 31.—Land area of Kentucky, by land class and geographic unit, 1975

(In thousands of acres)

Geographic unit	Commercial forest land	Unproductive forest land	Productive-reserved forest land	Total forest land	Nonforest land	All land
Western	704.1	2.5	4.4	711.0	1,479.8	2,190.8
Western Coalfield	1,845.4	3.4	50.5	1,899.3	3,579.2	5,478.5
Pennyroyal	2,129.1	12.7	68.9	2,210.7	2,570.0	4,780.7
Bluegrass	1,330.1	—	7.4	1,337.5	4,304.3	5,641.8
Northern Cumberland	1,848.4	—	40.8	1,889.2	606.7	2,495.9
Southern Cumberland	2,156.7	.6	24.8	2,182.1	600.5	2,782.6
Eastern	1,888.1	26.9	16.0	1,931.0	203.5	2,134.5
All units	11,901.9	46.1	212.8	12,160.8	13,344.0	25,504.8

Table 32.—Area of commercial forest land in Kentucky, by ownership class and geographic unit, 1975

(In thousands of acres)

Ownership class	Western	Western Coalfield	Pennyroyal	Bluegrass	Northern Cumberland	Southern Cumberland	Eastern	Total
National Forest	—	—	27.0	16.2	103.5	394.5	47.6	588.8
Other Federal	125.6	5.1	72.6	1.8	—	.2	24.6	229.9
State	6.9	21.2	4.1	3.1	.8	24.5	15.4	76.0
County and municipal	.3	.1	.1	.1	—	—	—	.6
Total public	132.8	26.4	103.8	21.2	104.3	419.2	87.6	895.3
Forest industry	47.3	20.2	26.4	—	81.6	26.6	53.0	255.1
Farmer-owned	368.5	1,157.2	1,228.3	905.6	880.4	682.2	266.8	5,489.0
Miscellaneous private:								
Individual	155.5	422.4	746.4	372.1	725.8	958.5	1,051.1	4,431.8
Corporate	—	219.2	24.2	31.2	56.3	70.2	429.6	830.7
Total miscellaneous private	155.5	641.6	770.6	403.3	782.1	1,028.7	1,480.7	5,262.5
All ownerships	704.1	1,845.4	2,129.1	1,330.1	1,848.4	2,156.7	1,888.1	11,901.9

Table 33.—Area of commercial forest land in Kentucky, by stand-size class and geographic unit, 1975

(In thousands of acres)

Geographic unit	Sawtimber stands	Poletimber stands	Other stands	All classes
Western	278.8	196.3	229.0	704.1
Western Coalfield	757.4	465.1	622.9	1,845.4
Pennyroyal	1,097.6	547.8	483.7	2,129.1
Bluegrass	381.5	308.6	640.0	1,330.1
Northern Cumberland	794.4	550.0	504.0	1,848.4
Southern Cumberland	1,153.4	555.0	448.3	2,156.7
Eastern	1,081.2	383.3	423.6	1,888.1
Total	5,544.3	3,006.1	3,351.5	11,901.9

Table 34.—Area of commercial forest land in Kentucky, by stand-volume class and geographic unit, 1975

(In thousands of acres)

Geographic unit	Standard-volume per acre (board feet)[a]			All classes
	Less than 1,500	1,500–5,000	More than 5,000	
Western	283.3	318.5	102.3	704.1
Western Coalfield	622.4	860.7	362.3	1,845.4
Pennyroyal	608.7	1,095.9	424.5	2,129.1
Bluegrass	904.3	396.4	29.4	1,330.1
Northern Cumberland	660.1	833.5	354.8	1,848.4
Southern Cumberland	715.9	1,216.1	224.7	2,156.7
Eastern	596.4	881.4	410.3	1,888.1
Total	4,391.1	5,602.5	1,908.3	11,901.9

[a] International ¼-inch rule.

Table 35.—Area of commercial forest land in Kentucky, by stocking-percent class and geographic unit, 1975

(In thousands of acres)

Geographic unit	Stocking class (growing-stock trees)				All classes
	Over-stocked	Fully stocked	Medium stocked	Poorly stocked	
Western	33.9	304.8	297.8	67.6	704.1
Western Coalfield	74.8	828.7	872.6	69.3	1,845.4
Pennyroyal	62.2	760.4	1,207.3	99.2	2,129.1
Bluegrass	29.7	338.3	712.1	250.0	1,330.1
Northern Cumberland	94.9	836.6	821.7	95.2	1,848.4
Southern Cumberland	117.4	908.6	953.4	177.3	2,156.7
Eastern	13.5	584.2	1,049.1	241.3	1,888.1
Total	426.4	4,561.6	5,914.0	999.9	11,901.9

Table 36.—Area of commercial forest land in Kentucky, by area-condition class and geographic unit, 1975

(In thousands of acres)

Geographic units	Area-condition class			All classes
	Classes 10-50	Class 60	Class 70	
Western	311.9	317.8	74.4	704.1
Western Coalfield	840.5	935.5	69.4	1,845.4
Pennyroyal	572.8	1,432.2	124.1	2,129.1
Bluegrass	265.3	770.3	294.5	1,330.1
Northern Cumberland	883.5	869.6	95.3	1,848.4
Southern Cumberland	930.2	1,037.3	189.2	2,156.7
Eastern	516.7	1,103.0	268.4	1,888.1
Total	4,320.9	6,465.7	1,115.3	11,901.9

Table 37.—Area of commercial forest land in Kentucky, by potential site productivity class and geographic unit, 1975

(In thousands of acres)

Geographic unit	Growth-per-acre class (cubic feet)				All classes
	120 to 165	85 to 120	50 to 85	Less than 50	
Western	40.9	95.2	291.4	276.6	704.1
Western Coalfield	138.3	476.8	687.8	542.5	1,845.4
Pennyroyal	151.5	585.9	783.0	608.7	2,129.1
Bluegrass	117.6	221.0	563.5	428.0	1,330.1
Northern Cumberland	71.9	356.8	1,001.7	418.0	1,848.4
Southern Cumberland	189.2	63.6	983.1	351.8	2,156.7
Eastern	213.3	675.4	635.1	364.3	1,888.1
Total	922.7	3,043.7	4,945.6	2,989.9	11,901.9

Table 38.—Area of commercial forest land in Kentucky, by forest type group and geographic unit, 1975

(In thousands of acres)

Geographic unit	White and red pine	Loblolly/ shortleaf pine	Oak/pine	Oak/ hickory	Oak/ gum	Elm/ash/ red maple	Maple/ beech/ birch	All groups
Western	—	13.6	26.8	481.2	13.6	148.7	20.2	704.1
Western Coalfield	—	74.9	88.4	1,357.3	24.9	201.0	98.9	1,845.4
Pennyroyal	—	236.1	161.4	1,232.0	49.7	125.2	324.7	2,129.1
Buegrass	—	207.3	250.5	677.1	—	121.7	73.5	1,330.1
Northern Cumberland	12.0	119.4	157.9	1,286.3	—	142.9	129.9	1,848.4
Southern Cumberland	11.9	261.9	299.0	1,239.1	—	107.5	237.3	2,156.7
Eastern	14.3	29.6	56.6	1,215.5	13.4	89.0	469.7	1,888.1
Total	38.2	942.8	1,040.6	7,488.5	101.6	936.0	1,354.2	11,901.9

Table 39.—Number of growing-stock trees and rough and rotten trees on commercial forest land in Kentucky by diameter-class groups, softwoods and hardwoods, and geographic unit, 1975

(In thousands of trees)

Diameter-class group (in inches)	Western	Western Coalfield	Pennyroyal	Bluegrass	Northern Cumberland	Southern Cumberland	Eastern	Total
				GROWING-STOCK TREES				
Softwoods								
5.0 - 8.9	1,512	4,488	18,513	13,410	20,824	30,898	6,927	96,57
9.0 - 18.9	400	1,545	3,953	2,951	9,453	18,706	3,579	40,58
19.0 and larger	—	65	23	—	77	192	130	48
Total	1,912	6,098	22,489	16,361	30,354	49,796	10,636	137,64
Hardwoods								
5.0 - 10.9	56,418	133,937	140,982	81,924	137,991	157,133	114,675	823,06
11.0 - 18.9	15,533	39,328	47,113	17,259	35,235	38,949	34,400	227,81
19.0 and larger	1,282	3,914	4,676	1,989	3,279	3,398	5,903	24,44
Total	73,233	177,179	192,771	101,172	176,505	199,480	154,978	1,075,31
All species	75,145	183,277	215,260	117,533	206,859	249,276	165,614	1,212,96
				ROUGH AND ROTTEN TREES				
Softwoods								
5.0 - 8.9	572	1,838	3,459	4,358	511	1,224	923	12,88
9.0 - 18.9	107	344	2,019	808	—	789	405	4,47
19.0 and larger	—	—	20	—	—	—	—	2
Total	679	2,182	5,498	5,166	511	2,013	1,328	17,37
Hardwoods								
5.0 - 10.9	8,751	17,824	28,804	29,932	25,399	24,184	40,514	175,40
11.0 - 18.9	1,153	2,156	4,418	3,280	2,005	4,783	6,463	24,25
19.0 and larger	258	352	1,079	451	442	1,459	2,374	6,41
Total	10,162	20,332	34,301	33,663	27,846	30,426	49,351	206,08
All species	10,841	22,514	39,799	38,829	28,357	32,439	50,679	223,45

Table 40.—Number of growing-stock trees on commercial forest land, by species and diameter class, Western Unit, Kentucky, 1975

(In thousands of trees)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
dar	509	114	395	—	—	—	—	—	—	—	—
ine	1,324	846	157	199	122	—	—	—	—	—	—
sof oods	79	—	—	—	39	—	23	17	—	—	—
l s woods	1,912	960	552	199	161	—	23	17	—	—	—
whi oaks	10,162	3,176	2,262	1,691	1,024	837	692	373	41	60	6
red ks	4,012	1,076	1,048	587	505	274	192	84	42	192	12
whi oaks	8,255	2,308	2,377	1,464	1,003	604	263	154	58	12	12
red ks	9,682	2,692	2,089	1,565	1,144	894	547	389	155	180	27
apl	1,045	381	328	114	41	54	69	—	40	12	6
nap	2,498	507	899	526	335	144	60	16	—	11	—
y	10,578	4,342	2,517	1,506	962	685	335	172	40	19	—
	523	141	—	240	—	50	24	18	14	22	14
	4,768	2,282	1,448	687	147	24	102	51	27	—	—
val t	613	262	190	65	36	60	—	—	—	—	—
um	2,320	1,176	193	263	259	165	191	16	41	16	—
n-po ar	501	277	—	51	33	87	21	17	15	—	—
um	1,423	126	588	328	212	108	40	—	14	7	—
har oods	16,853	9,986	2,839	1,821	1,177	312	365	166	52	106	29
l ha dwoods	73,233	28,732	16,778	10,908	6,878	4,298	2,901	1,456	539	637	106
pec s	75,145	29,692	17,330	11,107	7,039	4,298	2,924	1,473	539	637	106

Table 41.—Number of growing-stock trees on commercial forest land, by species and diameter class, Western Coalfield Unit, Kentucky, 1975

(In thousands of trees)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
ar	4,901	3,524	613	647	68	49	—	—	—	—	—
ne	1,005	—	183	448	266	—	67	—	—	41	—
oftoods	192	—	168	—	—	—	—	—	24	—	—
sc woods	6,098	3,524	964	1,095	334	49	67	—	24	41	—
hi oaks	19,669	4,016	4,428	4,298	2,729	2,066	1,119	498	201	314	—
ed ks	7,965	2,091	1,511	1,230	982	529	842	168	175	428	9
hi oaks	13,029	4,080	3,258	2,218	1,675	1,081	395	214	44	45	19
ed ks	19,345	7,173	3,402	2,664	2,361	1,582	936	421	223	488	95
ple	7,931	3,340	1,361	1,280	626	591	307	224	71	96	35
ap	9,995	3,650	2,513	1,695	707	520	489	273	70	78	—
	32,514	14,037	5,294	6,555	3,114	1,603	1,022	560	135	183	11
	2,514	576	173	462	495	271	279	52	24	152	30
	13,387	6,863	2,919	1,597	973	471	351	117	47	49	—
all t	2,438	594	711	452	459	143	32	27	—	20	—
im	6,364	1,179	2,157	1,366	979	452	113	58	25	35	—
pe ar	6,354	1,474	776	1,635	739	747	434	223	148	142	36
m	5,543	2,062	958	1,428	497	326	151	85	—	36	—
ar oods	30,131	16,376	6,584	3,501	1,706	844	366	304	301	134	15
ha dwoods	177,179	67,511	36,045	30,381	18,042	11,226	6,836	3,224	1,464	2,200	250
ec s	183,277	71,035	37,009	31,476	18,376	11,275	6,903	3,224	1,488	2,241	250

Table 42.—Number of growing-stock trees on commercial forest land, by species and diameter class, Pennyr[illegible]al Unit, Kentucky, 1975

(In thousands of trees)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	9.0+
Redcedar	12,791	8,061	3,578	618	267	137	74	56	—	—	—
Hard pines	9,698	3,533	3,341	1,302	925	403	146	25	23	—	—
Total softwoods	22,489	11,594	6,919	1,920	1,192	540	220	81	23	—	—
Select white oaks	26,472	5,923	6,472	4,497	4,023	2,101	2,043	952	139	322	—
Select red oaks	8,421	1,502	2,294	1,160	1,328	627	548	416	299	238	9
Other white oaks	17,244	5,461	3,112	2,721	1,780	1,867	1,230	689	265	119	—
Other red oaks	24,641	7,390	4,767	4,722	2,713	1,859	1,372	817	492	477	32
Red maple	8,085	3,723	2,811	746	247	234	97	83	67	44	33
Sugar maple	19,140	9,826	4,719	1,994	915	670	559	335	70	52	—
Hickory	30,635	11,233	6,838	6,505	2,798	2,104	492	339	155	171	—
Beech	7,985	1,903	1,525	993	949	798	644	549	250	318	56
Ash	7,420	1,789	1,578	1,708	1,439	548	139	112	45	54	8
Black walnut	3,241	1,344	827	329	431	292	—	—	—	18	—
Sweetgum	2,939	1,523	652	263	255	196	—	26	24	—	—
Yellow-poplar	14,525	5,127	3,921	1,700	1,581	725	553	412	234	253	19
Blackgum	5,237	1,760	1,570	490	981	235	68	109	24	—	—
Basswood	268	—	—	88	122	—	36	—	22	—	—
Other hardwoods	16,518	6,156	4,294	3,026	1,319	687	415	254	130	197	40
Total hardwoods	192,771	64,660	45,380	30,942	20,881	12,943	8,196	5,093	2,216	2,263	97
All species	215,260	76,254	52,299	32,862	22,073	13,483	8,416	5,174	2,239	2,263	97

Table 43.—Number of growing-stock trees on commercial forest land, by species and diameter class, Bluegras[illegible]Unit, [illegible] Kentucky, 1975

(In thousands of trees)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	9.0+
Redcedar	11,685	8,070	2,326	738	245	181	85	40	—	—	—
Hard pines	4,676	1,440	1,574	1,090	334	186	52	—	—	—	—
Total softwoods	16,361	9,510	3,900	1,828	579	367	137	40	—	—	—
Select white oaks	12,760	6,187	2,209	1,605	1,271	608	412	184	59	199	26
Select red oaks	3,048	—	722	824	464	300	184	307	115	124	8
Other white oaks	4,580	1,215	1,574	910	450	—	179	150	56	46	—
Other red oaks	7,543	2,461	2,033	1,729	814	175	131	33	90	77	—
Red maple	3,083	1,938	474	126	183	184	50	—	90	24	14
Sugar maple	6,654	1,828	2,167	1,394	403	457	231	38	30	106	—
Hickory	17,413	6,689	3,975	3,436	1,318	1,109	335	332	150	69	—
Beech	55	—	—	—	—	—	—	36	—	19	—
Ash	9,842	1,763	4,090	1,836	842	562	320	179	151	89	10
Black walnut	7,673	3,946	1,797	901	411	285	235	40	32	26	—
Yellow-poplar	1,452	449	175	116	237	288	91	38	—	58	—
Blackgum	957	829	—	—	—	128	—	—	—	—	—
Basswood	809	325	—	—	164	122	95	76	27	—	—
Other hardwoods	25,303	12,112	6,281	3,808	1,846	315	240	407	145	137	12
Total hardwoods	101,172	39,742	25,497	16,685	8,403	4,533	2,503	1,820	945	974	70
All species	117,533	49,252	29,397	18,513	8,982	4,900	2,640	1,860	945	974	70

ble 44.—Number of growing-stock trees on commercial forest land, by species and diameter class, Northern Cumberland Unit, Kentucky, 1975

(In thousands of trees)

pecies	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-8.9	19.0-20.9	21.0-28.9	29.0+
ce r	434	320	114	—	—	—	—	—	—	—	—
rd ies	27,999	12,406	7,194	5,197	1,938	873	340	51	—	—	—
ner ftwoods	1,921	553	237	555	241	88	144	26	67	—	10
ot softwoods	30,354	13,279	7,545	5,752	2,179	961	484	77	67	—	10
ct hite oaks	26,803	9,396	6,015	4,811	3,210	1,964	847	323	104	133	—
ct d oaks	6,494	2,333	887	1,016	325	708	540	211	172	302	—
er hite oaks	23,702	6,982	5,825	4,540	2,808	1,798	817	375	306	215	36
er d oaks	32,680	9,624	8,188	4,872	3,610	2,859	1,905	788	466	326	42
l n le	13,203	8,282	1,632	2,039	434	300	301	109	87	19	—
ar aple	2,305	1,236	424	273	197	40	98	—	21	16	-
kc	34,437	16,990	8,950	5,048	1,646	1,185	334	100	106	78	—
ch	4,050	1,213	1,026	631	235	256	144	107	166	235	37
t	1,728	442	582	177	194	139	131	27	—	36	—
ck alnut	697	—	146	277	129	46	99	—	—	—	—
eet m	308	—	—	152	108	48	—	—	—	—	—
lo oplar	17,280	5,851	3,796	3,277	1,931	985	796	300	243	101	—
ck m	2,289	457	999	342	173	195	65	58	—	—	—
sw d	644	205	—	260	52	85	—	29	—	13	—
ner rdwoods	9,885	4,895	2,732	1,168	600	313	130	28	—	19	—
ot hardwoods	176,505	67,906	41,202	28,883	15,652	10,921	6,207	2,455	1,671	1,493	115
ll ecies	206,859	81,185	48,747	34,635	17,831	11,882	6,691	2,532	1,738	1,493	125

Table 45.—Number of growing-stock trees on commercial forest land, by species and diameter class, Southern Cumberland Unit, Kentucky, 1975

(In thousands of trees)

pecies	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
ce r	632	473	—	—	128	—	31	—	—	—	—
d es	46,349	16,404	12,442	9,068	5,751	1,845	669	129	41	—	—
er ftwoods	2,815	935	644	565	256	118	99	47	42	102	7
ot oftwoods	49,796	17,812	13,086	9,633	6,135	1,963	799	176	83	102	7
ct ite oak	34,212	15,030	7,599	5,800	2,654	1,166	934	624	194	194	17
ct d oaks	8,893	3,549	1,616	1,116	662	745	618	210	197	164	16
er ite oaks	18,374	6,609	3,435	3,835	1,802	1,139	870	307	147	221	9
er d oaks	24,915	5,630	6,039	4,456	2,769	2,584	1,855	964	344	274	—
m le	13,050	7,135	3,625	839	533	664	200	—	41	13	—
ar aple	5,292	2,150	1,441	759	584	316	30	—	—	12	—
ko	32,507	15,585	7,414	4,707	2,140	1,241	699	380	165	176	—
ch	4,997	1,661	1,190	467	335	323	269	180	196	306	70
	3,241	1,627	671	430	260	163	37	24	—	29	-
k alnut	1,982	198	1,100	247	238	176	—	—	23	—	-
et n	1,631	779	548	304	—	—	—	—	—	—	-
ov oplar	28,941	9,206	6,989	5,104	3,157	2,542	939	672	166	138	28
k n	4,347	2,542	478	174	462	245	161	155	68	62	—
sw d	3,237	2,014	421	155	505	37	31	57	—	17	—
er rdwoods	13,861	7,478	3,905	1,076	572	546	97	76	64	47	—
ot ardwoods	199,480	81,193	46,471	29,469	16,673	11,887	6,740	3,649	1,605	1,653	140
ll ecies	249,276	99,005	59,557	39,102	22,808	13,850	7,539	3,825	1,688	1,755	147

Table 46.—Number of growing-stock trees on commercial forest land, by species and diameter class, Eastern Unit, Kentucky, 1975

(In thousands of trees)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29+
Hard pines	9,306	3,638	2,954	1,476	740	205	179	100	14	—	—
Other softwoods	1,330	—	335	479	139	167	41	53	67	49	—
Total softwoods	10,636	3,638	3,289	1,955	879	372	220	153	81	49	—
Select white oaks	13,896	7,151	2,401	1,314	821	760	693	272	226	241	17
Select red oaks	5,342	1,252	1,081	717	615	514	257	318	192	360	36
Other white oaks	11,933	2,829	2,534	1,945	1,189	915	657	579	426	633	226
Other red oaks	23,398	7,478	4,927	3,309	2,039	2,137	1,565	1,057	394	436	56
Red maple	10,541	5,743	2,529	650	787	343	222	117	49	95	6
Sugar maple	5,015	1,933	947	855	635	195	189	122	71	67	1
Hickory	21,361	8,008	5,385	2,539	2,048	1,505	955	501	192	186	42
Beech	7,961	1,390	2,261	1,056	750	533	411	461	369	673	57
Ash	2,927	662	740	1,009	166	225	78	26	—	21	—
Black walnut	2,627	1,901	168	302	148	—	108	—	—	—	—
Sweetgum	177	—	94	67	—	—	—	—	—	16	—
Yellow-poplar	28,761	9,691	7,199	5,698	2,776	1,759	906	366	142	213	11
Blackgum	2,795	654	728	251	372	323	210	143	94	20	—
Basswood	6,879	3,610	1,465	750	341	242	243	88	97	43	—
Other hardwoods	11,365	6,833	1,267	1,352	1,135	341	173	69	96	88	11
Total hardwoods	154,978	59,135	33,726	21,814	13,822	9,792	6,667	4,119	2,348	3,092	463
All species	165,614	62,773	37,015	23,769	14,701	10,164	6,887	4,272	2,429	3,141	463

Table 47.—Net volume of timber on commercial forest land in Kentucky, by class of timber and geographic unit, 1975

(In millions of cubic feet)

Geographic unit	Growing-stock trees			Rough trees	Rotten trees	All trees
	Sawtimber	Poletimber	Total			
Western	494.0	326.9	820.9	37.6	15.5	874.0
Western Coalfield	1,208.7	728.9	1,937.6	120.9	42.5	2,101.0
Pennyroyal	1,374.2	796.1	2,170.3	178.7	63.2	2,412.2
Bluegrass	315.8	265.3	581.1	83.4	21.4	685.9
Northern Cumberland	1,160.2	811.7	1,971.9	65.3	47.7	2,084.9
Southern Cumberland	1,214.8	886.8	2,101.6	147.2	96.9	2,345.7
Eastern	1,245.3	615.0	1,860.3	109.6	140.4	2,110.3
Total	7,013.0	4,430.7	11,443.7	742.7	427.6	12,614.0

Table 48.—Net volume of growing stock and sawtimber on commercial forest land in Kentucky, by ownership class and geographic unit, 1975

Geographic unit	Ownership classes				All classes
	National forest	Other public	Forest industry	Farmer and other	
			Million cubic feet		
Western	—	146.9	43.9	630.1	820.9
Western Coalfield	—	29.3	18.8	1,889.5	1,937.6
Pennyroyal	34.1	85.0	24.5	2,026.7	2,170.3
Bluegrass	20.5	5.6	—	555.0	581.1
Northern Cumberland	130.8	.9	75.7	1,764.5	1,971.9
Southern Cumberland	498.5	27.4	24.7	1,551.0	2,101.6
Eastern	60.1	44.2	49.2	1,706.8	1,860.3
Total	744.0	339.3	236.8	10,123.6	11,443.7
			Million board feet[a]		
Western	—	297.4	100.6	1,577.6	1,975.6
Western Coalfield	—	59.1	43.1	4,551.1	4,653.3
Pennyroyal	87.5	172.1	56.1	5,097.5	5,413.2
Bluegrass	52.5	11.3	—	1,216.4	1,280.2
Northern Cumberland	335.5	1.8	173.6	3,721.6	4,232.5
Southern Cumberland	1,277.9	55.3	56.7	3,493.6	4,883.5
Eastern	154.1	89.5	112.8	4,757.2	5,113.6
Total	1,907.5	686.5	542.9	24,415.0	27,551.9

[a] International ¼-inch rule.

Table 49.—Net volume of growing stock and sawtimber on commercial forest land in Kentucky, by stand-size class and geographic unit, 1975

Saw-Geographic unit	Timber stands	Pole-timber stands	Other stands	All stands
		Million cubic feet		
Western	478.4	271.1	71.4	820.9
Western Coalfield	1,163.5	502.5	271.6	1,937.6
Pennyroyal	1,450.3	561.0	159.0	2,170.3
Bluegrass	288.3	160.7	132.1	581.1
Northern Cumberland	1,170.1	574.4	227.4	1,971.9
Southern Cumberland	1,438.9	521.6	141.1	2,101.6
Eastern	1,347.1	368.6	144.6	1,860.3
Total	7,336.6	2,959.9	1,147.2	11,443.7
		Million board feet[a]		
Western	1,407.9	459.0	108.7	1,975.6
Western Coalfield	3,409.1	753.0	491.2	4,653.3
Pennyroyal	4,323.2	793.5	296.5	5,413.2
Bluegrass	884.6	231.3	164.3	1,280.2
Northern Cumberland	3,094.4	745.4	392.7	4,232.5
Southern Cumberland	3,895.6	772.0	215.9	4,883.5
Eastern	4,267.6	591.6	254.4	5,113.6
Total	21,282.4	4,345.8	1,923.7	27,551.9

[a] International ¼-inch rule.

Table 50.—Net volume of growing stock and sawtimber on commercial forest land in Kentucky, by forest type group and geogrphic unit, 1975

Geographic unit	White and red pine	Loblolly/ shortleaf pine	Oak/pine	Oak/ hickory	Oak-gum/ cypress	Elm-ash/ red maple	Maple/ beech/ birch	All groups
				Million cubic feet				
Western	—	1.8	20.8	618.8	23.2	125.3	31.0	820.9
Western Coalfield	—	26.1	68.0	1,495.2	34.4	186.0	127.9	1,937.6
Pennyroyal	—	103.7	128.6	1,432.3	32.4	100.3	373.0	2,170.3
Bluegrass	—	63.0	96.6	356.1	—	32.8	32.6	581.1
Northern Cumberland	12.8	112.6	113.7	1,475.9	—	119.4	137.5	1,971.9
Southern Cumberland	18.9	244.4	305.3	1,263.1	—	54.5	215.4	2,101.6
Eastern	21.2	18.7	23.3	1,232.6	24.8	77.3	462.4	1,860.3
Total	52.9	570.3	756.3	7,874.0	114.8	695.6	1,379.8	11,443.7
				Million board feet[a]				
Western	—	2.2	31.5	1,518.1	71.3	287.1	65.4	1,975.6
Western Coalfield	—	25.7	168.3	3,507.2	105.4	498.3	348.4	4,653.3
Pennyroyal	—	155.0	339.7	3,603.7	51.1	226.7	1,037.0	5,413.2
Bluegrass	—	132.9	156.6	852.5	—	50.8	87.4	1,280.2
Northern Cumberland	27.9	203.3	242.2	3,151.5	—	237.0	370.6	4,232.5
Southern Cumberland	42.2	536.5	704.0	2,925.1	—	72.9	602.8	4,883.5
Eastern	57.5	42.9	29.4	3,374.6	89.6	181.5	1,338.1	5,113.6
Total	127.6	1,098.5	1,671.7	18,932.7	317.4	1,554.3	3,849.7	27,551.9

[a] International ¼-inch rule.

Table 51.—Net volume of growing stock on commercial forest land, by species and diameter class, Western Unit, Kentucky, 1975

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	30.0+
Redcedar	3.1	0.5	2.6	—	—	—	—	—	—	—	—
Hard pines	6.3	.9	1.0	2.4	2.0	—	—	—	—	—	—
Other softwoods	1.6	—	—	—	.5	—	0.6	0.5	—	—	—
Total softwoods	11.0	1.4	3.6	2.4	2.5	—	0.6	0.5	—	—	—
Select white oaks	127.2	9.9	13.9	17.5	17.6	20.9	23.6	16.5	2.3	4.4	0.6
Select red oaks	64.0	3.4	7.0	6.9	9.4	7.0	6.9	3.9	2.3	15.7	1.5
Other white oaks	90.4	7.3	14.0	16.3	17.9	14.6	8.7	6.7	2.7	.7	1.4
Other red oaks	147.0	9.5	14.4	18.0	20.1	22.4	18.4	17.3	9.2	14.2	3.5
Red maple	13.3	1.8	2.3	1.2	.6	1.4	2.1	—	2.3	.8	.6
Sugar maple	30.1	2.0	7.0	6.9	6.4	3.7	2.5	.8	—	.8	—
Hickory	105.2	14.8	15.6	17.1	16.9	16.7	12.4	7.8	2.4	1.5	—
Beech	10.5	.6	—	2.5	—	1.3	.7	.8	.8	1.7	2.1
Ash	36.2	8.1	8.8	7.5	2.8	.8	4.0	2.5	1.7	—	—
Black walnut	4.4	.9	1.0	.6	.6	1.3	—	—	—	—	—
Sweetgum	28.4	3.9	1.1	3.2	4.8	4.1	6.8	.7	2.3	1.5	—
Yellow-poplar	6.7	1.2	—	.6	.7	2.0	.7	.7	.8	—	—
Blackgum	17.4	.6	4.0	3.7	3.3	2.9	1.5	—	.8	.6	—
Other hardwoods	129.1	30.5	17.3	19.0	19.7	7.5	12.2	7.2	3.0	8.1	4.6
Total hardwoods	809.9	94.5	106.4	121.0	120.8	106.6	100.5	64.9	30.6	50.0	4.6
All species	820.9	95.9	110.0	123.4	123.3	106.6	101.1	65.4	30.6	50.0	4.6

ble 52.—Net volume of growing stock on commercial forest land, by species and diameter class, Western Coalfield Unit, Kentucky, 1975

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
ed	18.6	10.3	2.7	4.3	0.6	0.7	—	—	—	—	—
pi s	7.6	—	.5	2.9	2.5	—	1.7	—	—	—	—
s woods	5.1	—	.7	—	—	—	—	—	0.9	3.5	—
al ftwoods	31.3	10.3	3.9	7.2	3.1	0.7	1.7	—	0.9	3.5	—
te oaks	271.0	11.9	25.1	42.6	44.3	51.0	37.5	21.4	11.8	25.4	—
oaks	134.1	6.2	9.2	13.1	15.2	12.7	28.2	7.3	10.3	30.9	1.0
te oaks	137.6	12.5	18.4	23.3	27.3	24.4	13.1	9.7	2.4	3.8	2.7
oaks	253.0	22.1	19.2	26.9	39.7	37.4	30.4	18.1	11.8	36.1	11.3
a	87.4	9.2	8.5	13.0	9.8	13.5	9.8	9.1	3.2	6.4	4.9
ple	111.2	14.3	17.0	17.7	12.1	12.3	16.5	12.5	3.6	5.2	—
y	308.5	41.0	31.0	65.9	50.6	37.7	34.7	25.2	7.2	14.1	1.1
	51.3	2.8	.9	4.7	8.1	6.2	9.0	2.5	1.0	12.5	3.6
	96.6	19.3	15.9	15.6	15.1	10.0	11.3	4.6	2.1	2.7	—
nut	24.6	1.5	4.1	4.7	7.1	3.4	1.2	1.3	—	1.3	—
gt	66.7	4.0	12.5	14.1	17.1	9.3	3.6	2.3	1.3	2.5	—
w plar	98.4	5.1	4.1	16.4	12.1	16.8	13.2	9.0	7.5	10.4	3.8
gt	52.6	6.2	5.8	13.9	8.4	7.6	4.6	3.6	—	2.5	—
h dwoods	213.3	44.8	35.8	34.4	26.9	19.9	11.9	13.1	15.1	9.1	2.3
al ardwoods	1,906.3	200.9	207.5	306.3	293.8	262.2	225.0	139.7	77.3	162.9	30.7
sp ies	1,937.6	211.2	211.4	313.5	296.9	262.9	226.7	139.7	78.2	166.4	30.7

b 53.—Net volume of growing stock on commercial forest land, by species and diameter class, Pennyroyal Unit, Kentucky, 1975

(In millions of cubic feet)

ecies	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.8	21.0-28.9	29.0+
e	55.8	22.8	17.6	5.6	3.4	2.7	1.9	1.8	—	—	—
es	62.6	7.3	14.5	12.1	13.5	9.0	4.0	1.1	1.1	—	—
a oftwoods	118.4	30.1	32.1	17.7	16.9	11.7	5.9	2.9	1.1	—	—
ite oaks	333.0	16.9	33.7	43.5	63.4	46.8	64.0	37.5	6.6	20.6	—
l oaks	124.3	3.8	13.2	11.2	21.0	13.8	16.7	16.2	13.6	14.0	0.8
ite oaks	203.7	15.2	16.5	25.2	26.7	39.7	36.3	25.3	12.3	6.5	—
l oaks	306.2	21.3	27.7	46.2	40.4	41.9	42.2	31.3	23.4	28.4	3.4
n le	59.5	10.3	15.7	7.0	4.0	5.1	3.0	3.4	3.4	2.6	5.0
ple	147.0	32.7	27.7	20.1	15.0	15.4	16.7	13.3	3.1	3.0	—
	264.2	30.6	35.3	62.8	42.8	47.2	14.8	12.8	7.7	10.2	—
	138.2	6.3	9.2	10.2	15.0	18.3	21.1	21.7	11.9	18.7	5.8
	72.5	4.7	7.2	14.8	20.6	11.6	4.0	4.1	1.8	3.0	.7
lnut	24.6	3.3	4.5	3.5	6.6	5.7	—	—	—	1.0	—
n	19.6	4.5	3.1	2.6	3.6	3.9	—	.9	1.0	—	—
oplar	161.8	15.6	21.5	18.0	25.5	16.7	17.7	16.4	11.7	16.5	2.2
n	45.5	6.0	8.5	4.2	14.8	4.9	2.0	4.1	1.0	—	—
d	5.2	—	—	.9	2.1	—	1.1	—	1.1	—	—
rdwoods	146.6	17.0	23.7	28.0	19.6	15.0	12.0	9.3	6.1	11.5	4.4
ardwoods	2,051.9	188.2	247.5	298.2	321.1	286.0	251.6	196.3	104.7	136.0	22.3
cies	2,170.3	218.3	279.6	315.9	338.0	297.7	257.5	199.2	105.8	136.0	22.3

Table 54.—Net volume of growing stock on commercial forest land, by species and diameter class, Bluegra Uni Kentucky, 1975

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)								
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9
Redcedar	33.7	15.9	7.5	3.9	1.9	2.2	1.5	0.8	—	—
Hard pines	17.2	1.8	4.4	5.2	2.7	2.3	.8	—	—	—
Total softwoods	50.9	17.7	11.9	9.1	4.6	4.5	2.3	0.8	—	—
Select white oaks	71.2	10.8	7.6	9.4	11.1	8.0	7.9	4.2	1.8	8.7
Select red oaks	35.4	—	2.6	4.9	4.5	4.0	3.4	6.5	3.7	5.0
Other white oaks	25.9	2.3	4.5	5.4	3.4	—	3.4	3.4	1.7	1.8
Other red oaks	39.5	4.3	6.4	9.2	7.4	2.4	2.6	.9	2.8	3.5
Red maple	14.2	3.6	1.0	.7	1.4	2.3	.9	—	2.5	1.0
Sugar maple	40.7	4.3	8.4	8.0	4.0	5.6	4.3	.9	.9	4.3
Hickory	87.4	9.7	12.0	19.1	11.9	14.2	5.9	7.7	4.3	2.6
Beech	1.8	–	—	—	—	—	—	.9	—	.9
Ash	56.6	3.3	11.8	9.4	7.0	6.9	5.5	4.1	4.2	3.6
Black walnut	30.1	6.6	4.8	4.5	3.7	3.9	3.9	.9	1.0	.8
Yellow-poplar	13.7	.6	.7	.7	2.3	4.2	1.7	.9	—	2.6
Blackgum	2.8	1.2	—	—	—	1.6	—	—	—	—
Basswood	9.0	.6	—	—	1.6	1.8	1.9	2.1	1.0	—
Other hardwoods	101.9	18.8	18.8	19.7	15.8	3.9	4.2	9.6	4.5	5.8
Total hardwoods	530.2	66.1	78.6	91.0	74.1	58.8	45.6	42.1	28.4	40.6
All species	581.1	83.8	90.5	100.1	78.7	63.6	47.9	42.9	28.4	40.6

Table 55.—Net volume of growing stock on commercial forest land, by species and diameter class, North n Cumberland Unit, Kentucky, 1975

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)								
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9
Redcedar	1.6	0.8	0.8	—	—	—	—	—	—	—
Hard pines	180.1	26.3	36.4	50.6	31.5	21.3	11.6	2.4	—	—
Other softwoods	24.9	2.3	1.8	6.2	3.8	1.9	4.0	1.0	3.1	—
Total softwoods	206.6	29.4	39.0	56.8	35.3	23.2	15.6	3.4	3.1	—
Select white oaks	286.3	28.4	35.7	51.4	58.0	49.8	30.6	15.3	6.3	10.8
Select red oaks	98.3	7.4	5.1	10.7	4.7	16.3	17.0	7.9	8.5	20.7
Other white oaks	266.2	22.3	32.7	45.6	47.9	42.9	25.5	15.2	15.0	13.8
Other red oaks	396.8	34.0	52.0	49.7	56.3	65.8	58.7	30.8	22.2	22.2
Red maple	84.8	25.1	8.9	18.2	6.2	6.8	9.3	4.4	4.6	1.3
Sugar maple	18.5	4.4	2.7	2.6	2.9	.9	3.1	—	1.0	.9
Hickory	240.0	48.4	51.0	53.1	28.4	29.3	11.7	5.2	5.9	7.0
Beech	60.7	3.2	4.8	5.2	3.5	5.5	3.8	3.9	8.5	18.3
Ash	21.4	1.4	4.2	1.8	3.2	3.1	4.5	1.2	—	2.0
Black walnut	9.8	—	.6	2.6	2.0	1.1	3.5	—	—	—
Sweetgum	4.9	—	—	1.9	2.0	1.0	—	—	—	—
Yellow-poplar	184.1	19.8	22.7	31.4	29.5	21.8	24.3	12.6	13.6	8.4
Blackgum	21.8	1.7	5.8	3.5	2.9	3.9	2.1	1.9	—	—
Basswood	9.4	.8	—	3.1	1.1	2.2	—	1.2	—	1.0
Other hardwoods	62.3	13.5	15.1	10.8	9.8	6.8	3.9	1.1	—	1.3
Total hardwoods	1,765.3	210.4	241.3	291.6	258.4	257.2	198.0	100.7	85.6	107.7
All species	1,971.9	239.8	280.3	348.4	293.7	280.4	213.6	104.1	88.7	107.7

ible 56.—Net volume of growing stock on commercial forest land, by species and diameter class, Southern Cumberland Unit, Kentucky, 1975

(In millions of cubic feet)

ecies	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
er	3.3	1.4	—	—	1.3	—	0.6	—	—	—	—
d es	323.2	39.7	62.4	80.9	80.2	35.7	18.0	4.5	1.8	—	—
r ftwoods	31.5	3.3	3.6	5.4	3.2	2.3	2.6	1.7	1.8	6.8	0.8
ta softwoods	358.0	44.4	66.0	86.3	84.7	38.0	21.2	6.2	3.6	6.8	0.8
t ite oaks	281.3	44.3	43.0	56.4	39.8	25.0	26.8	23.4	9.0	11.7	1.9
t d oaks	98.4	11.1	8.8	9.9	9.5	16.1	16.8	7.2	8.3	9.0	1.7
r ite oaks	167.4	22.3	18.8	32.3	24.3	21.6	21.3	9.6	5.8	10.8	.6
r d oaks	300.1	17.7	32.5	41.6	40.3	53.8	49.8	33.8	14.4	16.2	—
m le	74.4	22.0	18.1	7.6	6.9	12.2	5.1	—	1.7	.8	—
r aple	38.0	8.4	8.3	7.2	7.0	5.5	.9	—	—	.7	—
o	246.4	45.9	41.3	46.9	32.8	26.2	20.4	14.6	7.9	10.4	
h	72.2	4.7	5.8	4.2	4.8	6.7	7.1	5.9	8.8	18.0	6.2
	25.0	5.2	4.0	4.1	3.6	4.0	.9	1.1	—	2.1	—
k ulnut	16.6	.7	5.6	2.2	3.4	3.8	—	—	.9	—	—
et m	8.4	2.4	2.8	3.2	—	—	—	—	—	—	—
w oplar	268.9	28.7	38.3	45.6	41.8	48.9	24.0	23.5	7.1	8.4	2.6
k n	39.6	7.5	2.9	1.7	6.6	5.1	4.4	5.5	2.6	3.3	—
w d	23.2	5.8	2.4	1.8	7.6	1.0	1.2	2.2	—	1.2	—
r rdwoods	83.7	21.1	20.7	10.6	8.5	11.7	2.9	2.9	2.9	2.4	—
t hardwoods	1,743.6	247.8	253.3	275.3	236.9	241.6	181.6	129.7	69.4	95.0	13.0
ecies	2,101.6	292.2	319.3	361.6	321.6	279.6	202.8	135.9	73.0	101.8	13.8

ble 57.—Net volume of growing stock on commercial forest land, by species and diameter class, Eastern Unit, Kentucky, 1975

(In millions of cubic feet)

ecies	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
ies	64.2	6.9	14.4	15.2	12.6	5.1	5.3	4.0	0.7	—	—
ftwoods	22.1	—	2.2	5.5	2.0	3.6	1.3	2.2	2.8	2.5	—
softwoods	86.3	6.9	16.6	20.7	14.6	8.7	6.6	6.2	3.5	2.5	—
ite oaks	149.0	20.1	13.1	13.7	13.9	19.7	26.6	12.6	12.8	14.8	1.7
d oaks	98.0	3.6	5.8	6.9	9.9	12.1	8.4	13.6	9.6	22.9	5.2
ite oaks	190.1	9.5	14.9	18.5	18.0	19.6	18.1	20.7	18.2	31.4	21.2
d oaks	302.0	20.8	26.3	33.3	32.1	49.0	48.8	42.5	19.1	24.5	5.6
le	76.2	18.5	14.3	6.0	11.0	6.9	6.1	4.3	2.4	6.1	.6
aple	55.9	7.8	6.1	8.5	10.7	4.9	5.7	4.8	3.2	4.2	—
	244.3	24.5	31.0	28.0	37.6	38.6	34.9	23.7	10.5	10.7	4.8
	151.5	4.2	12.1	11.2	12.4	13.0	12.7	18.9	18.1	43.2	5.7
	27.6	1.6	4.0	9.8	2.5	5.0	2.1	1.3	—	1.3	—
ulnut	14.8	4.8	1.2	3.2	2.1	—	3.5	—	—	—	—
m	2.0	—	.5	.6	—	—	—	—		.9	—
oplar	274.3	32.8	42.3	56.4	43.3	37.0	27.8	14.0	7.1	12.6	1.0
n	41.4	2.1	4.0	2.9	5.9	7.5	7.0	6.0	4.9	1.1	
d	60.6	9.9	8.9	9.0	5.7	6.4	7.9	3.9	5.2	3.7	—
rdwoods	86.3	17.7	7.1	14.0	17.9	7.7	6.0	3.1	5.1	6.5	1.2
hardwoods	1,774.0	177.9	191.6	222.0	223.0	227.4	215.6	169.4	116.2	183.9	47.0
ecies	1,860.3	184.8	208.2	242.7	237.6	236.1	222.2	175.6	119.7	186.4	47.0

Table 58.—Net volume of sawtimber on commercial forest land, by species and diameter class, Western Unit, Kentucky, 1975

(In millions of board feet)[a]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Hard pines	14.4	6.8	7.6	—	—	—	—	—	—
Other softwoods	6.1	—	1.4	—	2.6	2.1	—	—	—
Total softwoods	20.5	6.8	9.0	—	2.6	2.1	—	—	—
Select white oaks	344.8	—	59.8	82.3	97.1	72.1	9.9	20.5	3.1
Select red oaks	196.0	—	31.8	27.1	29.2	17.1	10.0	74.1	6.7
Other white oaks	204.0	—	60.4	58.0	35.9	27.8	12.2	3.1	6.6
Other red oaks	430.4	—	68.5	87.7	75.1	76.4	41.0	65.5	16.2
Red maples	32.9	—	2.0	5.1	8.3	—	10.2	3.6	3.7
Sugar maple	53.6	—	21.4	14.7	10.6	3.4	—	3.5	—
Hickory	225.0	—	57.7	65.2	51.6	33.5	10.5	6.5	—
Beech	33.3	—	—	5.4	2.7	3.1	3.5	8.1	10.5
Ash	47.0	—	9.9	2.9	16.1	10.4	7.7	—	—
Black walnut	6.9	—	2.0	4.9	—	—	—	—	—
Sweetgum	81.1	—	16.0	16.7	28.0	3.1	10.5	6.8	—
Yellow-poplar	20.4	—	2.4	7.8	3.3	2.9	4.0	—	—
Blackgum	34.2	—	11.0	10.7	6.0	—	3.4	3.1	—
Other hardwoods	245.5	—	64.6	28.6	49.2	31.1	13.0	36.7	22.3
Total hardwoods	1,955.1	—	407.5	417.1	413.1	280.9	135.9	231.5	69.1
All species	1,975.6	6.8	416.5	417.1	415.7	283.0	135.9	231.5	69.1

[a] International ¼-inch rule.

Table 59.—Net volume of sawtimber on commercial forest land, by species and diameter class, Western Coalfield Unit, Kentucky, 1975

(In millions of board feet)[a]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Redcedar	18.6	13.6	2.4	2.6	—	—	—	—	—
Hard pines	26.7	10.3	9.6	—	6.8	—	—	—	—
Other softwoods	17.3	—	—	—	—	—	4.1	13.2	—
Total softwoods	62.6	23.9	12.0	2.6	6.8	—	4.1	13.2	—
Select white oaks	733.4	—	145.0	189.9	149.2	89.1	48.8	111.4	—
Select red oaks	420.5	—	48.3	47.7	111.0	29.2	42.4	137.0	4.9
Other white oaks	311.0	—	89.0	91.3	51.6	40.5	10.7	16.5	11.4
Other red oaks	729.0	—	130.4	142.5	119.7	74.9	50.7	159.9	50.9
Red maple	219.4	—	31.8	49.7	38.7	35.9	13.7	27.3	22.3
Sugar maple	236.5	—	37.8	45.9	63.8	49.6	15.3	24.1	—
Hickory	647.5	—	165.5	141.0	135.9	105.9	31.6	62.3	5.3
Beech	172.6	—	26.3	23.0	35.1	10.0	5.0	56.5	16.7
Ash	170.3	—	48.6	37.1	45.3	18.2	9.0	12.1	—
Black walnut	51.2	—	22.4	13.3	4.7	5.2	—	5.6	—
Sweetgum	133.7	—	56.8	35.3	15.1	9.7	6.2	10.6	—
Yellow-poplar	285.1	—	39.8	63.1	53.1	37.2	30.7	44.8	16.4
Blackgum	100.2	—	27.7	27.7	17.7	16.5	—	10.6	—
Other hardwoods	380.3	—	87.3	73.2	47.2	54.2	65.7	41.8	10.9
Total hardwoods	4,590.7	—	956.7	980.7	888.1	576.1	329.8	720.5	138.8
All species	4,653.3	23.9	968.7	983.3	894.9	576.1	333.9	733.7	138.8

[a] International ¼-inch rule.

Table 60.—Net volume of sawtimber on commercial forest land, by species and diameter class, Pennyroyal Unit, Kentucky, 1975

(In millions of board feet)[a]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Redcedar	52.0	18.9	12.4	7.2	7.3	6.2	—	—	—
Hard pines	148.0	43.5	49.8	31.8	14.7	4.1	4.1	—	—
Total softwoods	200.0	62.4	62.2	39.0	22.0	10.3	4.1	—	—
Select white oaks	942.2	—	214.7	179.3	263.1	161.9	29.0	94.2	—
Select red oaks	386.5	—	70.5	51.3	67.3	69.4	60.1	64.1	3.8
Other white oaks	573.3	—	88.8	147.8	145.2	108.2	53.8	29.5	—
Other red oaks	852.3	—	136.6	157.9	172.9	133.3	104.9	130.8	15.9
Red maple	108.7	—	13.4	18.8	11.9	14.4	15.1	12.1	23.0
Sugar maple	260.1	—	50.7	58.7	66.9	56.7	13.6	13.5	—
Hickory	521.9	—	144.6	180.8	61.1	53.7	34.5	47.2	—
Beech	462.4	—	50.3	69.1	84.7	92.5	51.9	86.9	27.0
Ash	168.4	—	67.2	43.3	15.4	17.6	7.9	13.3	3.7
Black walnut	48.0	—	22.5	20.9	—	—	—	4.6	—
Sweetgum	35.0	—	12.0	14.5	—	4.0	4.5	—	—
Yellow-poplar	432.9	—	86.0	63.7	74.3	70.2	51.8	76.3	10.6
Blackgum	96.9	—	48.9	18.1	8.4	17.0	4.5	—	—
Basswood	16.1	—	7.1	—	4.3	—	4.7	—	—
Other hardwoods	308.5	—	65.1	55.8	47.8	39.2	26.4	53.1	21.1
Total hardwoods	5,213.2	—	1,078.4	1,080.0	1,023.3	838.1	462.7	625.6	105.1
All species	5,413.2	62.4	1,140.6	1,119.0	1,045.3	848.4	466.8	625.6	105.1

[a] International ¼-inch rule.

Table 61.—Net volume of sawtimber on commercial forest land, by species and diameter class, Bluegrass Unit, Kentucky, 1975

(In millions of board feet)[a]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Redcedar	38.1	13.5	5.5	8.8	6.7	3.6	—	—	—
Hard pines	39.7	18.8	9.7	7.7	3.5	—	—	—	—
Total softwoods	77.8	32.3	15.2	16.5	10.2	3.6	—	—	—
Select white oaks	177.7	—	40.0	31.4	32.7	18.2	8.2	39.8	7.4
Select red oaks	117.6	—	16.2	15.8	14.3	27.7	16.9	23.1	3.6
Other white oaks	57.0	—	12.4	—	14.5	15.0	7.1	8.0	—
Other red oaks	79.0	—	26.7	9.2	9.9	4.3	12.9	16.0	—
Red maple	36.6	—	5.0	9.0	3.2	—	10.9	4.8	3.7
Sugar maple	81.8	—	14.4	22.3	17.8	3.9	3.7	19.7	—
Hickory	187.6	—	42.8	55.7	24.0	33.6	18.9	12.6	—
Beech	8.1	—	—	—	—	3.7	—	4.4	—
Ash	130.9	—	25.1	26.8	22.2	17.8	18.3	17.1	3.6
Black walnut	57.7	—	13.5	15.5	16.3	4.2	4.5	3.7	—
Yellow-poplar	47.4	—	8.2	16.1	7.1	4.3	—	11.7	—
Blackgum	5.9	—	—	5.9	—	—	—	—	—
Basswood	34.3	—	5.9	7.3	7.4	9.6	4.1	—	—
Other hardwoods	180.8	—	56.0	15.6	17.4	41.3	20.2	26.6	3.7
Total hardwoods	1,202.4	—	266.2	230.6	186.8	183.6	125.7	187.5	22.0
All species	1,280.2	32.3	281.4	247.1	197.0	187.2	125.7	187.5	22.0

[a] International ¼-inch rule.

Table 62.—Net volume of sawtimber on commercial forest land, by species and diameter class, Northern Cumberland Unit, Kentucky, 1975

(In millions of board feet)[a]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Hard pines	411.6	164.3	115.3	77.1	44.4	10.5	—	—	—
Other softwoods	77.4	23.0	13.7	7.2	14.9	3.8	12.9	—	1.9
Total softwoods	489.0	187.3	129.0	84.3	59.3	14.3	12.9	—	1.9
Select white oaks	611.8	—	189.4	176.6	114.6	59.4	25.4	46.4	—
Select red oaks	289.5	—	15.4	57.3	63.0	30.7	34.2	88.9	—
Other white oaks	604.7	—	156.3	151.4	94.6	59.1	60.7	59.2	23.4
Other red oaks	958.3	—	182.1	230.9	217.2	119.7	89.6	96.3	22.5
Red maple	119.1	—	20.0	23.9	34.5	16.9	18.4	5.4	—
Sugar maple	31.6	—	9.2	3.1	11.3	—	4.1	3.9	—
Hickory	311.1	—	91.9	101.9	42.8	20.0	24.0	30.5	—
Beech	191.3	—	11.1	18.5	13.8	15.1	34.3	80.6	17.9
Ash	50.0	—	10.1	10.5	16.5	4.5	—	8.4	—
Black walnut	22.7	—	6.2	3.9	12.6	—	—	—	—
Sweetgum	10.5	—	6.7	3.8	—	—	—	—	—
Yellow-poplar	404.5	—	96.6	77.2	90.4	49.3	55.2	35.8	—
Blackgum	37.7	—	9.6	13.4	7.6	7.1	—	—	—
Basswood	20.5	—	3.6	7.5	—	4.8	—	4.6	—
Other hardwoods	80.2	—	32.3	24.0	14.5	4.1	—	5.3	—
Total hardwoods	3,743.5	—	840.5	903.9	733.4	390.7	345.9	465.3	63.8
All species	4,232.5	187.3	969.5	988.2	792.7	405.0	358.8	465.3	65.7

[a] International ¼-inch rule.

Table 63.—Net volume of sawtimber on commercial forest land, by species and diameter class, Southern Cumberland Unit, Kentucky, 1975

(In millions of board feet)[a]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Redcedar	7.5	—	4.9	—	2.6	—	—	—	—
Hard pines	789.6	252.7	293.1	140.9	75.6	19.3	8.0	—	—
Other softwoods	101.5	16.9	11.5	8.9	10.8	7.7	8.4	33.1	4.2
Total softwoods	898.6	269.6	309.5	149.8	89.0	27.0	16.4	33.1	4.2
Select white oaks	569.3	—	144.0	96.6	112.0	104.7	43.1	58.7	10.2
Select red oaks	292.4	—	35.0	62.3	69.4	32.0	39.0	46.1	8.6
Other white oaks	385.1	—	85.5	83.2	89.5	42.3	26.9	54.6	3.1
Other red oaks	861.5	—	145.1	208.5	206.4	151.4	67.3	82.8	—
Red maple	103.8	—	23.9	47.1	21.2	—	7.5	4.1	—
Sugar maple	53.1	—	24.3	21.1	4.0	—	—	3.7	—
Hickory	457.5	—	117.3	101.3	84.9	64.9	36.4	52.7	—
Beech	261.0	—	17.6	25.7	29.7	25.9	40.8	90.3	31.0
Ash	47.4	—	13.0	15.3	3.8	4.8	—	10.5	—
Black walnut	30.0	—	11.6	14.4	—	—	4.0	—	—
Yellow-poplar	633.3	—	149.9	188.9	100.2	105.3	32.9	42.9	13.2
Blackgum	113.3	—	22.8	19.5	18.2	24.6	11.7	16.5	—
Basswood	50.9	—	26.8	3.8	4.8	9.8	—	5.7	—
Other hardwoods	126.3	—	30.2	44.7	12.0	13.3	13.9	12.2	—
Total hardwoods	3,984.9	—	847.0	932.4	756.1	579.0	323.5	480.8	66.1
All species	4,883.5	269.6	1,156.5	1,082.2	845.1	606.0	339.9	513.9	70.3

[a] International ¼-inch rule.

Table 64.—Net volume of sawtimber on commercial forest land, by species and diameter class, Eastern Unit, Kentucky, 1975

(In millions of board feet)[a]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Hard pines	147.9	47.5	44.7	19.1	17.6	15.8	3.2	—	—
Other softwoods	70.6	17.7	6.4	13.5	5.0	8.4	9.9	9.7	—
Total softwoods	218.5	65.2	51.1	32.6	22.6	24.2	13.1	9.7	—
Select white oaks	427.8	—	46.5	75.3	107.3	52.5	56.3	81.3	8.6
Select red oaks	352.9	—	32.1	45.6	33.6	56.5	42.4	117.9	24.8
Other white oaks	640.3	—	57.8	73.3	73.9	86.3	80.1	169.3	99.6
Other red oaks	921.7	—	103.6	185.0	198.2	177.8	84.8	138.2	34.1
Red maple	148.0	—	36.4	25.9	25.2	17.9	10.1	29.5	3.0
Sugar maple	131.9	—	34.3	18.7	23.6	20.5	14.6	19.9	.3
Hickory	640.7	—	122.1	145.9	141.1	99.8	46.2	62.9	22.7
Beech	549.2	—	40.8	48.6	51.8	78.8	82.0	218.5	28.7
Ash	46.6	—	8.1	18.7	8.6	5.3	—	5.9	—
Black walnut	21.2	—	6.7	—	14.5	—	—	—	—
Sweetgum	4.7	—	—	—	—	—	—	4.7	—
Yellow-poplar	566.3	—	143.9	141.4	113.4	59.2	31.9	71.5	5.0
Blackgum	127.7	—	19.3	28.4	28.2	25.4	21.6	4.8	—
Basswood	132.9	—	18.7	23.9	32.7	16.5	23.6	17.5	—
Other hardwoods	183.2	—	58.4	28.6	25.0	12.9	22.5	29.8	6.0
Total hardwoods	4,895.1	—	728.7	859.3	877.1	709.4	516.1	971.7	232.8
All species	5,113.6	65.2	779.8	891.9	899.7	733.6	529.2	981.4	232.8

[a] International ¼-inch rule.

Table 65.—Net volume of sawtimber on commercial forest land, by species and quality class, Western Unit, Kentucky, 1975

(In millions of board feet)[a]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[b]
Softwoods					
Hard pines	14.4	—	0.9	13.5	—
Other softwoods[c]	6.1	—	—	—	—
Total softwoods	20.5	—	0.9	13.5	—
Hardwoods					
Select white oaks	344.8	14.7	66.5	230.3	33.3
Select red oaks	196.0	13.6	62.5	100.8	19.1
Other white oaks	204.0	6.3	21.2	128.6	47.9
Other red oaks	430.4	21.2	65.5	290.8	52.9
Red maple	32.9	—	8.0	15.4	9.5
Sugar maple	53.6	5.2	3.1	22.1	23.2
Hickory	225.0	6.6	34.8	132.4	51.2
Beech	33.3	.2	—	20.8	12.3
Ash	47.0	10.7	13.2	14.7	8.4
Black walnut	6.9	—	—	6.2	.7
Sweetgum	81.1	11.8	14.3	46.8	8.2
Yellow-poplar	20.4	5.5	5.2	7.0	2.7
Blackgum	34.2	1.2	4.9	24.2	3.9
Other hardwoods	245.5	24.9	34.5	137.8	48.3
Total hardwoods	1,955.1	121.9	333.7	1,177.9	321.6
Hardwood quality (%)	100	6	17	60	17

[a] International ¼-inch rule.
[b] This applies only to hardwoods and is construction grade material.
[c] Species other than pine are not graded into standard-lumber grades.

Table 66.—Net volume of sawtimber on commercial forest land, by species and quality class, Western Coalfield Unit, Kentucky, 1975

(In millions of board feet)[a]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[b]
Softwoods					
Hard pines	26.7	—	—	26.7	—
Other softwoods[c]	35.9	—	—	—	—
Total softwoods	62.6	—	—	26.7	—
Hardwoods					
Select white oaks	733.4	79.3	148.0	404.0	102.1
Select red oaks	420.5	49.3	150.1	176.4	44.7
Other white oaks	311.0	19.8	41.5	189.0	60.7
Other red oaks	729.0	134.1	139.2	353.7	102.0
Red maple	219.4	10.0	40.6	107.5	61.3
Sugar maple	236.5	24.9	38.5	129.4	43.7
Hickory	647.5	53.4	109.2	385.8	99.1
Beech	172.6	.6	10.4	86.4	75.2
Ash	170.3	22.6	27.7	89.3	30.7
Black walnut	51.2	10.1	15.8	22.0	3.3
Sweetgum	133.7	14.9	21.6	82.7	14.5
Yellow-poplar	285.1	55.6	69.8	125.4	34.3
Blackgum	100.2	9.0	16.9	64.9	9.4
Other hardwoods	380.3	35.8	63.1	228.3	53.1
Total hardwoods	4,590.7	519.4	892.4	2,444.8	734.1
Hardwood quality (%)	100	11	20	53	16

[a] International ¼-inch rule.
[b] This applies only to hardwoods and is construction grade material.
[c] Species other than pine are not graded into standard-lumber grades.

Table 67.—Net volume of sawtimber on commercial forest land, by species and quality class, Pennyroyal Unit, Kentucky, 1975

(In millions of board feet)[a]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[b]
Softwoods					
Hard pines	148.0	17.6	26.5	103.9	—
Other softwoods[c]	52.0	—	—	—	—
Total softwoods	200.0	17.6	26.5	103.9	—
Hardwoods					
Select white oaks	942.2	153.1	196.1	418.0	175.0
Select red oaks	386.5	103.3	98.0	142.5	42.7
Other white oaks	573.3	102.0	129.3	251.0	91.0
Other red oaks	852.3	147.6	182.8	347.4	174.5
Red maple	108.7	20.2	20.2	34.4	33.9
Sugar maple	260.1	22.5	68.5	117.6	51.5
Hickory	521.9	64.0	100.8	230.2	126.9
Beech	462.4	13.1	33.5	174.8	241.0
Ash	168.4	14.5	46.7	62.2	45.0
Black walnut	48.0	3.0	10.0	31.1	3.9
Sweetgum	35.0	1.1	6.2	20.8	6.9
Yellow-poplar	432.9	129.0	70.8	120.6	112.5
Blackgum	96.9	5.8	17.0	61.4	12.7
Basswood	16.1	—	5.8	9.1	1.2
Other hardwoods	308.5	39.6	76.3	138.3	54.3
Total hardwoods	5,213.2	818.8	1,062.0	2,159.4	1,173.0
Hardwood quality (%)	100	16	20	41	23

[a] International ¼-inch rule.
[b] This applies only to hardwoods and is construction grade material.
[c] Species other than pine are not graded into standard lumber grades.

Table 68.—Net volume of sawtimber on commercial forest land by species and quality class, Bluegrass Unit, Kentucky, 1975

(In millions of board feet)[a]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[b]
Softwoods					
Hard pines	39.7	—	3.1	36.6	—
Other softwoods[c]	38.1	—	—	—	—
Total softwoods	77.8	—	3.1	36.6	—
Hardwoods					
Select white oaks	177.7	26.9	46.4	83.7	20.7
Select red oaks	117.6	30.2	25.1	42.8	19.5
Other white oaks	57.0	13.4	13.2	25.5	4.9
Other red oaks	79.0	10.3	14.7	36.6	17.4
Red maple	36.6	6.4	6.8	18.2	5.2
Sugar maple	81.8	17.7	8.2	30.0	25.9
Hickory	187.6	12.7	30.7	111.0	33.2
Beech	8.1	—	—	3.2	4.9
Ash	130.9	23.9	35.2	35.9	35.9
Black walnut	57.7	7.8	13.6	30.9	5.4
Yellow-poplar	47.4	13.4	15.8	13.0	5.2
Blackgum	5.9	—	—	5.4	.5
Basswood	34.3	8.4	9.3	14.3	2.3
Other hardwoods	180.8	15.1	27.5	101.1	37.1
Total hardwoods	1,202.4	186.2	246.5	551.6	218.1
Hardwood quality (%)	100	15	21	46	18

[a] International ¼-inch rule.
[b] This applies only to hardwoods and is construction grade material.
[c] Species other than pine are not graded into standard-lumber grades.

Table 69.—Net volume of sawtimber on commercial forest land, by species and quality class, Northern Cumberland Unit, Kentucky, 1975

(In millions of board feet)[a]

Species	All classes	Standard-lumber logs			
			Grade 2	Grade 1 Grade 3	Grade 4[b]
Softwoods					
Hard pines	411.6	5.3	25.8	380.5	—
Other softwoods[c]	77.4	—	—	—	—
Total softwoods	489.0	5.3	25.8	380.5	—
Hardwoods					
Select white oaks	611.8	16.4	65.7	387.0	142.7
Select red oaks	289.5	22.1	70.9	139.3	57.2
Other white oaks	604.7	11.9	62.1	376.1	154.6
Other red oaks	958.3	33.5	100.4	593.2	231.2
Red maple	119.1	2.8	11.1	82.1	23.1
Sugar maple	31.6	—	.6	17.3	13.7
Hickory	311.1	13.9	31.9	216.9	48.4
Beech	191.3	.4	2.8	113.5	74.6
Ash	50.0	2.8	11.7	21.8	13.7
Black walnut	22.7	—	6.0	14.4	2.3
Sweetgum	10.5	.1	.1	6.5	3.8
Yellow-poplar	404.5	24.4	54.6	229.0	96.5
Blackgum	37.7	2.4	1.2	28.8	5.3
Basswood	20.5	—	3.0	12.7	4.8
Other hardwoods	80.2	.3	17.5	45.4	17.0
Total hardwoods	3,743.5	131.0	439.6	2,284.0	888.9
Hardwood quality (%)	100	3	12	61	24

[a] International ¼-inch rule.
[b] This applies only to hardwoods and is construction grade material.
[c] Species other than pine are not graded into standard lumber grades.

Table 70.—Net volume of sawtimber on commercial forest land, by species and quality class, Southern Cumberland Unit, Kentucky, 1975

(In millions of board feet)[a]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[b]
Softwoods					
Hard pines	789.6	58.3	109.4	621.9	—
Other softwoods[c]	109.0	—	—	—	—
Total softwoods	898.6	58.3	109.4	621.9	—
Hardwoods					
Select white oaks	569.3	70.9	137.1	298.4	62.9
Select red oaks	292.4	82.0	52.6	115.6	42.2
Other white oaks	385.1	57.4	85.5	176.6	65.6
Other red oaks	861.5	124.4	194.1	380.2	162.8
Red maple	103.8	8.2	20.4	51.9	23.3
Sugar maple	53.1	8.1	7.0	32.1	5.9
Hickory	457.5	64.8	102.5	198.3	91.9
Beech	261.0	3.7	36.3	173.3	47.7
Ash	47.4	6.2	15.6	16.2	9.4
Black walnut	30.0	—	5.3	21.4	3.3
Yellow-poplar	633.3	91.7	111.9	223.6	206.1
Blackgum	113.3	17.9	26.8	53.5	15.1
Basswood	50.9	5.4	5.4	36.3	3.8
Other hardwoods	126.3	5.9	26.1	64.5	29.8
Total hardwoods	3,984.9	546.6	826.6	1,841.9	769.8
Hardwood quality (%)	100	14	21	46	19

[a] International ¼-inch rule.
[b] This applies only to hardwoods and is construction grade material.
[c] Species other than pine are not graded into standard lumber grades.

Table 71.—Net volume of sawtimber on commercial forest land, by species and quality class, Eastern Unit, Kentucky, 1975

(In millions of board feet)[a]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[b]
Softwoods					
Hard pines	147.9	12.3	11.3	124.3	—
Other softwoods[c]	70.6	—	—	—	—
Total softwoods	218.5	12.3	11.3	124.3	—
Hardwoods					
Select white oaks	427.8	42.7	75.2	219.1	90.8
Select red oaks	352.9	75.4	64.2	142.3	71.0
Other white oaks	640.3	116.6	93.8	284.1	145.8
Other red oaks	921.7	192.1	141.6	399.5	188.5
Red maple	148.0	12.2	34.9	56.9	44.0
Sugar maple	131.9	19.1	9.7	58.8	44.3
Hickory	640.7	105.9	130.7	325.7	78.4
Beech	549.2	8.3	19.9	356.2	164.8
Ash	46.6	—	18.9	18.1	9.6
Black walnut	21.2	3.1	1.5	13.9	2.7
Sweetgum	4.7	—	3.1	1.1	.5
Yellow-poplar	566.3	31.9	73.5	227.0	233.9
Blackgum	127.7	34.0	33.3	46.6	13.8
Basswood	132.9	14.4	10.4	99.8	8.3
Other hardwoods	183.2	27.9	26.6	98.4	30.3
Total hardwoods	4,895.1	683.6	737.3	2,347.5	1,126.7
Hardwood quality (%)	100	14	15	48	23

[a] International ¼-inch rule.
[b] This applies only to hardwoods and is construction grade material.
[c] Species other than pine are not graded into standard lumber grades.

Table 72.—Annual net growth and removals of growing stock and sawtimber on commercial forest land in Kentucky, by geographic unit, 1974

Geographic unit	Growing stock		Sawtimber	
	Annual net growth	Annual removals	Annual net growth	Annual removals
	Thousand cubic feet		*Thousand board feet*[a]	
Western	27,461	17,001	78,497	53,205
Western Coalfield	77,073	41,776	203,778	127,943
Pennyroyal	80,113	27,980	221,977	92,782
Bluegrass	26,887	8,437	62,229	15,300
Northern Cumberland	61,264	19,215	127,378	63,281
Southern Cumberland	60,288	25,828	123,492	77,974
Eastern	58,314	8,663	135,649	32,515
Total	391,400	148,900	953,000	463,000

[a] International ¼-inch rule.

Table 73.—Land area in Kentucky, by land class, county, and geographic unit, 1975

Geographic unit and county	Total land area[a]	Nonforest land area	Forest land		
			Non commercial[b]	Commercial	
	Thousand acres				*Percent*
Ballard	165.9	121.4	1.4	43.1	26
Calloway	245.8	166.2	—	79.6	32
Carlisle	125.1	93.2	1.1	30.8	25
Fulton	129.9	103.6	—	26.3	20
Graves	358.3	276.0	—	82.3	23
Hickman	157.5	122.1	.3	35.1	22
Livingston	199.5	120.4	—	79.1	40
Lyon	161.8	80.9	—	80.9	50
McCracken	159.7	121.0	.2	38.5	24
Marshall	193.7	125.2	2.4	66.1	34
Trigg	293.6	149.8	1.5	142.3	48
Western Unit	2,190.8	1,479.8	6.9	704.1	32
Allen	232.9	139.5	.7	92.7	40
Barren	311.0	241.5	2.1	67.4	22
Butler	283.4	135.8	—	147.6	52
Caldwell	228.4	140.1	—	88.3	39
Christian	464.1	293.9	.6	169.6	37
Crittenden	233.3	140.7	—	92.6	40
Daviess	295.6	239.6	.6	55.4	19
Edmonson	194.6	79.2	44.8	70.6	36
Henderson	277.1	222.8	1.6	52.7	19
Hopkins	353.8	200.1	2.1	151.6	43
Logan	360.1	244.5	.1	115.5	32
McLean	164.5	123.1	—	41.4	25
Monroe	213.7	120.8	.1	92.8	43
Muhlenberg	307.5	172.4	1.0	134.1	44
Ohio	381.2	186.2	—	195.0	51
Simpson	152.9	129.8	—	23.1	15
Todd	240.3	165.8	—	74.5	31
Union	217.9	183.9	—	34.0	16
Warren	349.4	261.6	.2	87.6	25
Webster	216.8	157.9	—	58.9	27
Western Coalfield Unit	5,478.5	3,579.2	53.9	1,845.4	34

CONTINUED

Table 73.—Continued

Geographic unit and county	Total land area[a]	Nonforest land area	Forest land		
			Non commercial[b]	Commercial	
	Thousand acres				*Percent*
Anderson	131.8	86.7	0.2	44.9	34
Bath	183.7	125.4	—	58.3	32
Boone	159.6	110.2	.2	49.2	31
Bourbon	192.0	181.7	—	10.3	5
Boyle	117.3	96.3	—	21.0	18
Bracken	130.4	84.3	—	46.1	35
Campbell	95.4	66.9	.2	28.3	30
Carroll	83.5	45.8	.6	37.1	44
Clark	165.8	143.7	—	22.1	13
Fayette	179.3	170.1	.3	8.9	5
Fleming	224.0	151.1	—	72.9	33
Franklin	135.0	95.4	—	39.6	29
Gallatin	63.8	36.2	—	27.6	43
Garrard	151.3	124.4	—	26.9	18
Grant	159.2	104.7	.3	54.2	34
Harrison	197.1	158.8	—	38.3	19
Henry	185.0	138.5	.4	46.1	25
Jefferson	239.8	203.3	3.1	33.4	14
Jessamine	113.4	98.1	—	15.3	13
Kenton	105.7	73.6	.4	31.7	30
Lincoln	217.6	168.2	—	49.4	23
Madison	285.2	210.3	.7	74.2	26
Mason	152.1	125.5	—	26.6	17
Mercer	163.6	143.3	—	20.3	12
Montgomery	130.6	102.9	—	27.7	21
Nicholas	130.6	103.6	—	27.0	21
Oldham	117.4	91.5	—	25.9	22
Owen	224.6	131.2	—	93.4	42
Pendleton	178.6	118.8	.7	59.1	33
Robertson	64.6	43.9	.1	20.6	32
Scott	181.8	150.7	—	31.1	17
Shelby	245.1	200.2	.2	44.7	18
Spencer	123.5	95.3	—	28.2	23
Trimble	93.5	51.3	—	42.2	45
Washington	196.4	161.8	—	34.6	18
Woodford	123.5	110.6	—	12.9	10
Bluegrass Unit	5,641.8	4,304.3	7.4	1,330.1	24
Adair	251.5	128.6	13.1	109.8	44
Breckenridge	361.2	203.8	4.9	152.5	42
Bullitt	192.0	87.6	.6	103.8	54
Casey	278.5	127.4	.8	150.3	54
Clinton	121.3	55.0	2.5	63.8	53
Cumberland	198.2	67.0	2.0	129.2	65
Grayson	327.5	177.3	4.7	145.5	44
Green	180.5	119.4	.2	60.9	34
Hancock	119.7	55.6	.5	63.6	53
Hardin	394.3	251.9	.7	141.7	36
Hart	272.0	154.9	6.4	110.7	41
Larue	166.4	105.7	.4	60.3	36
Marion	219.5	146.7	.5	72.3	33
Meade	195.3	112.3	2.4	80.6	41
Metcalfe	189.4	105.0	.4	84.0	44
Nelson	279.6	181.1	.7	97.8	35
Pulaski	418.2	217.4	8.6	192.2	46
Russell	152.5	75.5	13.4	63.6	42
Taylor	181.4	108.5	13.0	59.9	33
Wayne	281.7	89.3	5.8	186.6	66
Pennyroyal	4,780.7	2,570.0	81.6	2,129.1	45

CONTINUED

Table 73.—Continued

Geographic unit and county	Total land area[a]	Nonforest land area	Forest land		
			Non commercial[b]	Commercial	
	Thousand acres				*Percent*
Boyd	102.1	41.3	0.1	60.7	59
Carter	257.4	69.5	6.7	181.2	70
Elliott	153.6	38.7	3.3	111.6	73
Greenup	224.3	66.3	3.6	154.4	69
Johnson	169.0	33.4	—	135.6	80
Lawrence	272.0	54.1	—	217.9	80
Lewis	311.3	79.8	—	231.5	74
Magoffin	193.9	30.6	—	163.3	84
Menifee	134.4	28.0	9.0	97.4	72
Morgan	236.2	63.8	—	172.4	73
Powell	110.7	26.3	5.1	79.3	72
Rowan	185.6	43.7	—	141.9	76
Wolfe	145.4	31.2	13.0	101.2	70
Northern Cumberland Unit	2,495.9	606.7	40.8	1,848.4	74
Bell	236.7	34.9	13.4	188.4	80
Breathitt	316.2	38.8	—	277.4	88
Clay	303.4	52.2	—	251.2	83
Estill	166.4	51.2	—	115.2	69
Jackson	215.7	62.0	—	153.7	71
Knox	238.7	54.2	—	184.5	77
Laurel	285.2	104.0	1.1	180.1	63
Lee	134.4	24.5	—	109.9	82
McCreary	267.4	30.5	10.4	226.5	85
Owsley	126.1	20.8	—	105.3	84
Rockcastle	199.0	63.7	—	135.3	68
Whitley	293.4	63.7	.5	229.2	78
Southern Cumberland Unit	2,782.6	600.5	25.4	2,156.7	78
Floyd	255.5	39.0	5.3	211.2	83
Harlan	300.0	23.5	8.3	268.2	89
Knott	227.9	19.5	4.7	203.7	89
Leslie	263.7	12.7	4.3	246.7	94
Letcher	217.0	19.3	3.2	194.5	90
Martin	147.8	16.0	1.9	129.9	88
Perry	219.6	18.6	8.8	192.2	88
Pike	503.0	54.9	6.4	441.7	88
Eastern Unit	2,134.5	203.5	42.9	1,888.1	88
State total	25,504.8	13,344.0	258.9	11,901.9	47

[a] Source: Area Measurement Report, Bureau of the Census, Areas of Kentucky, 1960 (July 1964).
[b] Includes unproductive and productive-reserved forest land.

Table 74.—Net volume of growing stock and sawtimber on commercial forest land by county and geographic unit, Kentucky, 1975

Geographic unit and county	Growing stock	Sampling error	Sawtimber	Sampling error
	Million cubic feet	*Percent*	*Million board feet*[a]	*Percent*
Ballard	46.5	22	109.8	28
Calloway	95.1	16	230.6	21
Carlisle	34.9	25	81.4	32
Fulton	31.1	28	78.4	37
Graves	78.6	18	180.4	25
Hickman	43.7	23	111.2	31
Livingston	99.5	15	243.0	20
Lyon	103.5	15	246.9	20
McCracken	38.3	26	92.5	35
Marshall	71.3	18	168.2	24
Trigg	178.4	11	433.2	15
Western Unit	820.9	3.1	1,975.6	4.2
Allen	107.1	18	266.7	27
Barren	71.5	22	175.1	31
Butler	162.5	14	390.8	22
Caldwell	87.6	20	203.6	29
Christian	188.3	14	455.1	20
Crittenden	92.2	20	216.9	29
Daviess	48.4	29	114.3	42
Edmonson	73.2	23	177.7	34
Henderson	50.1	27	116.1	40
Hopkins	153.2	15	368.0	23
Logan	134.6	17	332.3	24
McLean	38.1	31	90.4	41
Monroe	102.1	19	246.7	28
Muhlenberg	131.1	17	308.4	25
Ohio	204.4	13	487.9	19
Simpson	25.8	35	63.8	49
Todd	81.2	22	192.9	33
Union	35.1	28	84.0	38
Warren	93.3	20	224.5	28
Webster	57.8	27	138.1	38
Western Coalfield Unit	1,937.6	2.4	4,653.3	3.3
Adair	112.6	18	280.7	26
Breckenridge	149.0	14	370.7	20
Bullitt	106.1	17	266.0	25
Casey	167.4	13	426.6	19
Clinton	66.5	19	166.3	27
Cumberland	138.1	14	346.7	21
Grayson	142.0	15	351.1	22
Green	63.3	20	161.0	29
Hancock	64.5	21	159.2	31
Hardin	133.2	17	331.1	24
Hart	107.5	18	264.7	26
Larue	63.9	23	161.5	33
Marion	70.7	21	173.6	31
Meade	79.0	21	194.6	31
Metcalfe	91.1	18	232.6	26
Nelson	97.6	19	242.2	27
Pulaski	190.0	13	465.9	19
Russell	68.7	19	172.9	28
Taylor	63.4	21	160.1	29
Wayne	195.7	12	485.7	17
Pennyroyal Unit	2,170.3	2.0	5,413.2	2.6
Anderson	17.7	37	37.0	57
Bath	28.6	28	65.7	46
Boone	20.4	34	42.9	53
Bourbon	4.1	28	8.9	31
Boyle	10.9	43	25.7	62
Bracken	16.8	43	34.6	66
Campbell	12.0	43	26.2	64
Carroll	18.6	30	43.2	47
Clark	9.1	45	20.2	68
Fayette	3.9	30	9.3	33
Fleming	43.3	23	106.7	40
Franklin	14.8	49	29.6	78
Gallatin	12.5	45	27.2	69
Garrard	13.3	35	30.9	55

CONTINUED

Table 74.—Continued

Geographic unit and county	Growing stock stock	Sampling error	Saw-timber	Sampling error
	Million cubic feet	*Percent*	*Million board feet*[a]	*Percent*
Grant	15.9	39	29.1	62
Harrison	13.4	44	26.2	65
Henry	18.1	39	37.3	59
Jefferson	14.1	37	30.8	71
Jessamine	7.4	24	17.1	36
Kenton	13.3	41	28.3	61
Lincoln	25.7	30	60.4	47
Madison	32.4	33	72.3	50
Mason	12.5	40	28.3	59
Mercer	7.7	42	15.8	61
Montgomery	13.7	41	32.0	62
Nicholas	10.7	52	22.3	80
Oldham	11.2	37	24.8	53
Owen	48.5	22	114.1	36
Pendleton	19.7	41	37.6	66
Robertson	7.0	45	13.7	69
Scott	13.5	40	29.3	60
Shelby	18.1	37	38.0	54
Spencer	10.7	50	21.8	79
Trimble	18.8	36	41.0	54
Washington	17.1	36	39.8	56
Woodford	5.6	39	12.1	57
Bluegrass Unit	581.1	3.1	1,280.2	4.2
Boyd	54.6	22	111.5	35
Carter	184.4	11	391.9	17
Elliott	126.4	14	279.3	21
Greenup	164.3	13	349.8	19
Johnson	134.9	13	276.6	20
Lawrence	212.9	11	433.3	17
Lewis	273.1	9	624.1	13
Magoffin	166.1	11	340.9	18
Menifee	108.4	14	236.1	21
Morgan	171.4	12	349.1	18
Powell	92.5	15	206.5	22
Rowan	167.4	12	378.6	17
Wolfe	115.5	14	254.8	21
Northern Cumberland Unit	1,971.9	2.0	4,232.5	2.9
Bell	168.4	13	380.2	17
Breathitt	259.6	11	598.0	14
Clay	241.3	11	566.0	14
Estill	114.7	17	265.4	22
Jackson	157.5	13	375.1	17
Knox	169.4	12	385.9	16
Laurel	193.0	14	455.8	17
Lee	116.4	15	271.7	19
McCreary	231.0	11	544.1	14
Owsley	101.0	16	237.4	21
Rockcastle	130.6	15	298.9	19
Whitley	218.7	12	505.0	15
Southern Cumberland Unit	2,101.6	1.8	4,883.5	2.3
Floyd	204.2	13	558.3	17
Harlan	272.5	15	758.4	20
Knott	197.8	17	543.0	23
Leslie	246.3	9	679.9	12
Letcher	192.6	13	529.9	18
Martin	129.4	19	356.4	25
Perry	189.8	12	520.7	16
Pike	427.7	11	1,167.0	15
Eastern Unit	1,860.3	4.4	5,113.6	5.9
State total	11,443.7	1.0	27,551.9	1.5

[a] International ¼-inch rule.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1978—703-112:3

Kingsley, Neal P., and Douglas S. Powell.
1978. **The forest resources of Kentucky.** Northeast. For. Exp. Stn., Broomall, Pa.
97 p., illus. (U.S. Dep. Agric. For. Serv. Resour. Bull. NE-54)

A statistical and analytical report on the third forest survey of Kentucky conducted in 1973, 1974, and 1975. Statistical findings are based on both remeasured and new 10-point cluster plots. The present status and trends in forest-land area, timber volume, and annual growth and removals are discussed. Timber-products output by forest industries, based upon a canvass of industries in 1974, and the importance of timber to the economy of the State also are discussed. The report includes a discussion of the outlook for timber supplies through 2004, and forest-management opportunities in the State. The status and importance of the nontimber forest resources of Kentucky are also discussed. Included are 74 tables of statistical data.

(769)—905.2

Kingsley, Neal P., and Douglas S. Powell.
1978. **The forest resources of Kentucky.** Northeast. For. Exp. Stn., Broomall, Pa.
97 p., illus. (U.S. Dep. Agric. For. Serv. Resour. Bull. NE-54)

A statistical and analytical report on the third forest survey of Kentucky conducted in 1973, 1974, and 1975. Statistical findings are based on both remeasured and new 10-point cluster plots. The present status and trends in forest-land area, timber volume, and annual growth and removals are discussed. Timber-products output by forest industries, based upon a canvass of industries in 1974, and the importance of timber to the economy of the State also are discussed. The report includes a discussion of the outlook for timber supplies through 2004, and forest-management opportunities in the State. The status and importance of the nontimber forest resources of Kentucky are also discussed. Included are 74 tables of statistical data.

(769)—905.2

Kingsley, Neal P., and Douglas S. Powell.
1978. **The forest resources of Kentucky.** Northeast. For. Exp. Stn., Broomall, Pa.
97 p., illus. (U.S. Dep. Agric. For. Serv. Resour. Bull. NE-54)

A statistical and analytical report on the third forest survey of Kentucky conducted in 1973, 1974, and 1975. Statistical findings are based on both remeasured and new 10-point cluster plots. The present status and trends in forest-land area, timber volume, and annual growth and removals are discussed. Timber-products output by forest industries, based upon a canvass of industries in 1974, and the importance of timber to the economy of the State also are discussed. The report includes a discussion of the outlook for timber supplies through 2004, and forest-management opportunities in the State. The status and importance of the nontimber forest resources of Kentucky are also discussed. Included are 74 tables of statistical data.

(769)—905.2

Kingsley, Neal P., and Douglas S. Powell.
1978. **The forest resources of Kentucky.** Northeast. For. Exp. Stn., Broomall, Pa.
97 p., illus. (U.S. Dep. Agric. For. Serv. Resour. Bull. NE-54)

A statistical and analytical report on the third forest survey of Kentucky conducted in 1973, 1974, and 1975. Statistical findings are based on both remeasured and new 10-point cluster plots. The present status and trends in forest-land area, timber volume, and annual growth and removals are discussed. Timber-products output by forest industries, based upon a canvass of industries in 1974, and the importance of timber to the economy of the State also are discussed. The report includes a discussion of the outlook for timber supplies through 2004, and forest-management opportunities in the State. The status and importance of the nontimber forest resources of Kentucky are also discussed. Included are 74 tables of statistical data.

(769)—905.2

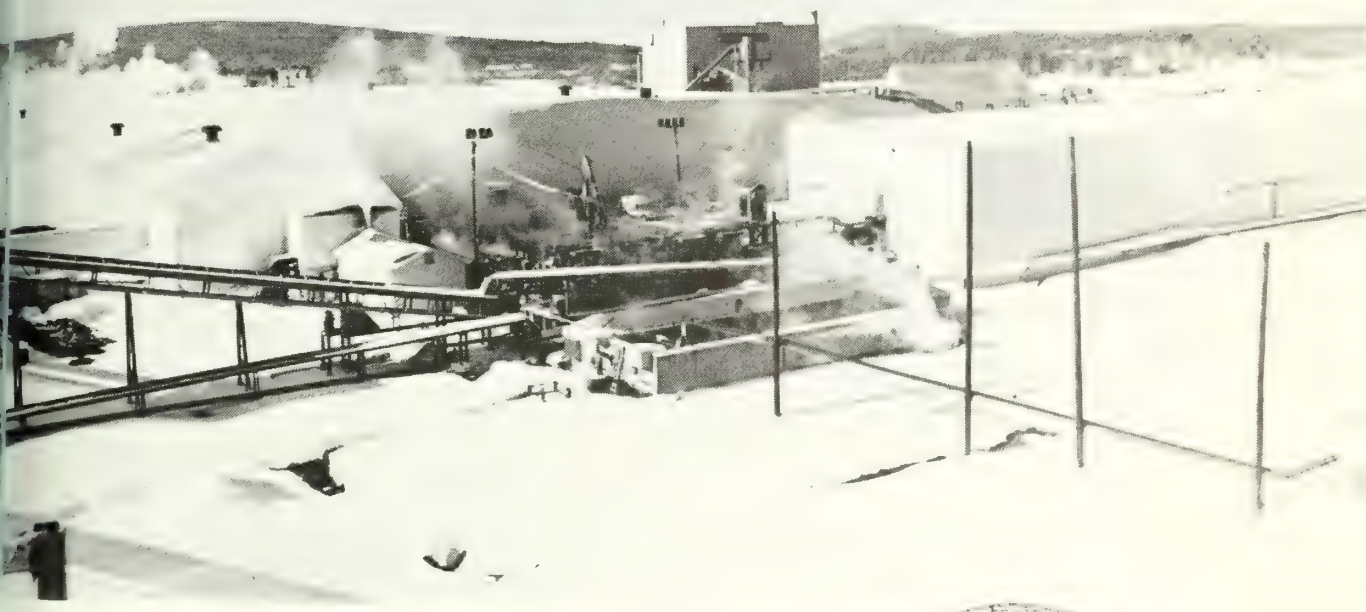
Headquarters of the Northeastern Forest Experiment Station are in Broomall, Pa. Field laboratories and research units are maintained at:

- Beltsville, Maryland.
- Berea, Kentucky, in cooperation with Berea College.
- Burlington, Vermont, in cooperation with the University of Vermont.
- Delaware, Ohio.
- Durham, New Hampshire, in cooperation with the University of New Hampshire.
- Hamden, Connecticut, in cooperation with Yale University.
- Kingston, Pennsylvania.
- Morgantown, West Virginia, in cooperation with West Virginia University, Morgantown.
- Orono, Maine, in cooperation with the University of Maine, Orono.
- Parsons, West Virginia.
- Pennington, New Jersey.
- Princeton, West Virginia.
- Syracuse, New York, in cooperation with the State University of New York College of Environmental Sciences and Forestry at Syracuse University, Syracuse.
- Warren, Pennsylvania.

VENEER, 1976—A Periodic Assessment of Regional Timber Output

GOVT. DOCUMENTS
DEPOSITORY ITEM
JUN 13 1978
CLEMSON
LIBRARY

by James T. Bones and David R. Dickson



JUN 13 1978

FOREST SERVICE RESOURCE BULLETIN NE-55
1978
FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE
NORTHEASTERN FOREST EXPERIMENT STATION
370 REED ROAD, BROOMALL, PA. 19008

THE AUTHORS

JAMES T. BONES, research forester, received his bachelor's degree in soil conservation from Utah State University in 1952 and his master's degree in forest management from the same university in 1956. He worked at the Pacific Northwest Forest and Range Experiment Station and the Institute of Northern Forestry until 1965, when he became a United Nations forestry advisor to the Government of Colombia in South America. After his return in March 1968, he was transferred to the Northeastern Forest Experiment Station. He is now stationed in Broomall, Pa, where he is working in the timber removals phase of Forest Resources Evaluation.

DAVID R. DICKSON, research forester, received his bachelor's degree in forestry from the University of New Hampshire in 1954. He joined the Lake States Forest Experiment Station in 1954. After serving 2 years in the Army, he joined the Northeastern Forest Experiment Station in 1957, and worked in various field and office phases of the Forest Survey. He is now responsible for operation of the data-processing system to compile, summarize, and analyze resource data from the studies of the Resources Evaluation work unit.

MANUSCRIPT RECEIVED FOR PUBLICATION 23 NOVEMBER 1977

COVER PHOTO. The successful startup in 1976 of this structural plywood plant, built by Georgia Pacific in McAdam, New Brunswick, Canada, signaled the beginning of what may be a major boost for veneer log production in the Northeast. The plant will use softwood veneer logs harvested in New Brunswick and Maine. The cores that remain after veneer is peeled from the logs will be processed into 2 x 4 studs at the company's Chip-N-Saw mill in Woodland, Maine, and chips from both plants will provide raw material for Georgia Pacific's pulp mill at Woodland, Maine. Bark, sawdust, and other waste will be burned to heat process water, dry plywood and studs, and heat buildings. (Cover photo courtesy Georgia Pacific Corp., Portland, Oreg.)

Highlights

THE 1976 veneer industry survey in the Northeast showed that since the 1972 survey:

★ Veneer log production rose 5 percent to 132 million board feet

★ Veneer log receipts at northeastern veneer plants dropped less than 1 percent

★ There were seven fewer veneer plants operating in the Northeast; new softwood plywood plant will be consuming northeastern timber.

★ Exports of veneer logs from the Northeast exceeded log imports by nearly 9 million board feet.

Background

Periodically in the Northeast, production of a single product is surveyed so that the importance of that product can be determined in relation to the timber-products industries as a whole. Veneer manufacturing ranks third in importance in the Northeast, as measured by annual receipts of industrial timber products, behind sawlogs and pulpwood. The most recent assessment of the veneer industry was conducted in 1972. Since then statewide industry evaluations conducted in conjunction with the reappraisals of the entire timber resource indicate that the veneer industry in the Northeast has been undergoing constant change.

Early in 1977, the Northeastern Forest Experiment Station contacted all operating veneer plants in the Station's 14-state territory (Connecticut,

Delaware, Kentucky, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, and West Virginia) for 1976 plant receipts (see list of plants, page 9). The survey was coordinated with surveys of states in the North Central, Southern, and Southeastern regions.

Information on wood receipts was exchanged with neighboring experiment stations to assure complete coverage by the Northeastern Station. In addition, log shipments to and from Canada were determined. Veneer logs that were harvested and exported through log brokers or concentrators overseas were not included in the survey.

Profile of the industry

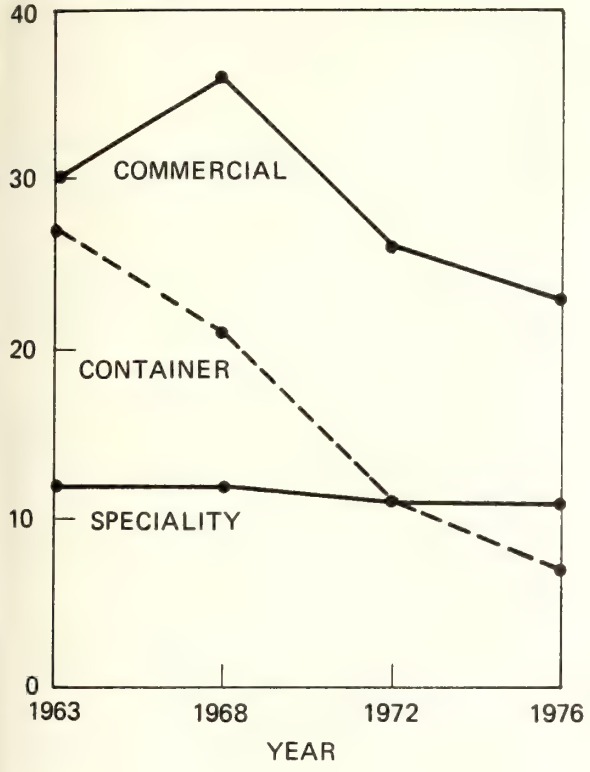
The veneer manufacturers of the Northeast can be separated into broad classes according to the industries they serve and the products they make. The following three classes of plants were identified in our survey: (1) commercial and face veneer manufacturers that produce veneer for the plywood and furniture industries; (2) container veneer manufacturers that fabricate veneer boxes, baskets, and similar containers, mostly for the vegetable and fruit growing and packing industries; and (3) specialty veneer manufacturers that produce hundreds of items ranging from tooth picks to ice cream spoons and tongue depressors.

Forty-one veneer plants were operating in the Northeast in 1976. These plants were scattered throughout the northeastern states. Some plants were located near veneer-log sources or product markets; others were located near major transportation networks and favorable labor markets. Because log requirements are more exacting for face and commercial veneer, these plants are willing to pay higher prices for raw materials and to transport logs from greater distances than others. Most container veneer plants, however, are located in agricultural sections of the Northeast, and procure their veneer logs and sell their products locally. Eight of the 11 specialty-veneer plants in 1976 were located in Maine and used mostly white birch bolts as a raw material. These plants provide a stable base for the State's wood using industries, since their wood requirements and product outputs fluctuate very little from year to year.

Characteristics of the three classes of veneer plants in the Northeast in 1976 were:

Characteristic	Class of veneer plant		
	Commercial and face	Container	Specialty
Volume of log receipts	3.4 million board feet per plant	1.4 million board feet per plant	3.2 million board feet per plant
Major species received	Red oaks, black cherry and walnut	Yellow-poplar soft maple, and sweetgum	White birch and hard maple
Size of log procurement area	From 3- to 14-state area	From consuming or neighboring state	From within consuming state
Plant location	Evenly scattered throughout Northeast	Atlantic coastal plain or bordering Great Lakes	Mostly in Maine
Product market areas	Eastern population and Southeastern furniture industry	Local agricultural areas	Nationwide

Figure 1.—Number of veneer plants operating in the Northeast, by class of plant, for selected years.



Though the total number of active veneer plants in the Northeast was the same in 1968 as in 1963, six container veneer plants closed and six commercial veneer plants opened during that period (Fig. 1). Twenty-two plants closed between 1968 and 1972 and one was added, reducing the total number of active plants from 69 to 48. Between 1972 and 1976, 8 more plants were closed and 1 was added, bringing the total to 41 active plants.

Container veneer industry. In all, 20 container veneer plants have closed since 1963, a decline of 74 percent. Sixteen plants closed between 1963 and 1972 and four closed between 1972 and 1976. Many things were responsible for these container veneer plant closures. Of major importance was slackening in demand for wooden containers. Family farms are being replaced by large-scale agribusinesses whose volume justifies the use of automated harvesting and transporting equipment.

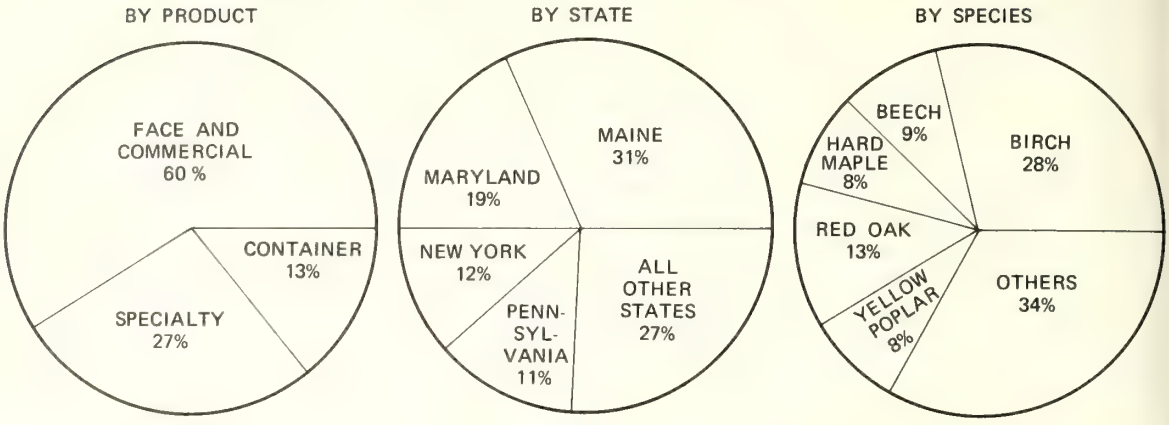
Another factor in changing demand is that increased labor and material costs have been passed along to the fruit and vegetable producers in the form of higher prices for wooden containers. Roadside produce retailers can no longer afford to absorb the cost of the basket when marketing their produce. The baskets are used for display only and the produce is transferred to a paper bag at the time of sale.

Container veneer plant closures can also be traced to a scarcity of skilled labor. The veneer production portion of a container plant can easily be automated, but the container assembly portion is quite labor intensive. Assembly workers are highly skilled and, when they retire, are difficult to replace.

Commercial veneer industry. The number of active commercial veneer plants in the Northeast rose from 30 to 36 between 1963 and 1968, and then dropped to 23 in 1976. This mixed performance can best be explained by relating plant closures to hardwood plywood consumption. Between 1963 and 1972 hardwood plywood consumption in the United States jumped from less than 2 billion square feet to over 8 billion square feet, but the increase was due entirely to an increase in imports of foreign plywood. This increased penetration of the United States hardwood plywood market by foreign producers caused many domestic veneer manufacturers who were directly competing for the same markets to close their plants. In some cases multinational corporations that closed domestic plants opened manufacturing facilities overseas. In the past 4 years, United States consumption of hardwood plywood has been dropping because of the worldwide economic slowdown. Decreased demand has adversely affected domestic production and imports equally, and contributed to the closure of four commercial veneer plants in the Northeast.

Specialty veneer industry. Specialty veneer plants made up 17 percent of all veneer plants in 1963 and 1968, but because of other veneer plant closures they made up 27 percent of the 1976 total. Eight of the 11 specialty veneer plants operating in 1976 are located in Maine; the others are in New Hampshire, Vermont, and New York. Species in demand by these plants are limited to white birch and hard maple.

Figure 2.—Veneer log production in percent, 1976.



Harvest up 5 Percent—Plant Receipts Unchanged

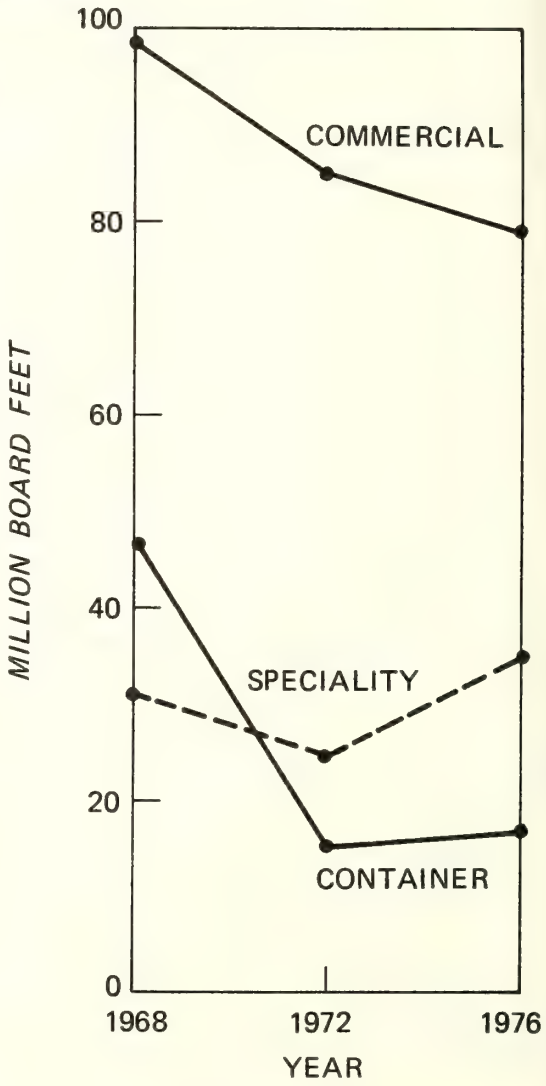
Veneer log production in the Northeast in 1976 was about 132 million board feet (International ¼-inch log rule); an increase of 5 percent from the 125 million board feet reported in 1972. Production gains from 1972 levels were reported by 7 of the 14 northeastern states. Individual gains ranged from 6 percent in Maine and Ohio to 100 percent in New Hampshire. Production losses ranged from 7 percent in Maryland to 100 percent in Connecticut.

Sixty percent—almost 80 million board feet—of the Northeast's veneer log production in 1976 went to plants producing commercial and face veneer (Fig. 2). This represented a 6 percent decrease from 1972 when 68 percent of the production went to commercial plants. Specialty veneer plants processed 27 percent of the northeastern production (35 million board feet) and container veneer plants processed 13 percent (17 million board feet).

During the last 8 years, veneer log production for commercial veneer and container plants has dropped, while production for specialty plants has risen (Fig. 3). The volume of logs going to container veneer plants has dropped 30 million board feet, while commercial veneer log production is down 19 million board feet. Since the average commercial veneer plant requires 10 times as much volume of veneer logs as the average container plant, the decrease represents a significant drop in container veneer demand.

The 40 million board feet of veneer logs that were harvested in Maine in 1976 represented 31

Figure 3.—Production of veneer logs in the Northeast, by class of plant, for selected years.



percent of the Northeast's production total and the 28 million board feet of the total that went to specialty veneer plants represented 81 percent of the specialty veneer log harvest. Maryland was the second largest producer of veneer logs in 1976, accounting for 19 percent of the Northeast total. Most of the Maryland production was from southern pines.

Birch continued to be the most important species used for veneer in the Northeast in 1976, but its once-dominant position is being challenged. Based on volume harvested, the following ranking of hardwood species shows the changes that have occurred during the last thirteen years:

1963	*Percent of Production*
Birch	35
Yellow-poplar	18
Hard maple	12
Red oak	7
Total	72

1968	*Percent of Production*
Birch	33
Yellow-poplar	18
Red oak	9
Hard maple	7
Total	67

1976	*Percent of Production*
Birch	28
Red oak	13
Beech	9
Hard maple	8
Total	58

The proportion of veneer made from red oak has increased during the period; the proportion made from yellow-poplar has decreased. Current heavy demand for high-quality hard maple for solid wood products has caused many commercial veneer plants to use more beech. Demand for yellow-poplar, the major species used for container veneer, has waned with the numerous container plant closures.

Use has spread over a larger range of species since 1963. In that year the four most preferred species accounted for 72 percent of the 153 million board feet that were produced, while in 1976 the four species accounted for only 58 percent of the production total.

Ash, soft maple, and white oak registered production gains of over 100 percent between 1972 and 1976. Southern pine veneer log production dropped 19 percent during the period to 21 million board feet.

Log receipts at veneer plants in the Northeast were 123 million board feet (International ¼-inch log rule) in 1976, unchanged from 1972. Only three states—New York, Pennsylvania, and Vermont—reported gains in log receipts between 1972 and 1976. Four of the 14 northeastern states have no operating veneer plants.

Interregional and Interstate Shipments

In both 1963 and 1968, the volume of veneer logs shipped out of the Northeast exceeded that of logs shipped into the region. This surplus of exports dropped from 26 million board feet (a 17 percent surplus) in 1963 to 21 million board feet (a 12 percent surplus) in 1968. In 1972, when demand was high for veneer logs, equilibrium was nearly reached; outshipments exceeded inshipments by only 1.7 million board feet (a 1 percent surplus). In 1976, exports exceeded imports by 9 million board feet (a 7 percent surplus) during a weak market for hardwood veneer logs.

Though commercial and face veneer producers are willing to transport logs great distances, specialty and container veneer producers purchase most of their veneer logs close to their plants. In states like Maine, where most of the Northeast's specialty veneer plants are located, a larger percentage of the industry's log requirement comes from within the State. In other states where commercial or face veneer is manufactured, veneer log imports and exports are both quite high, with only token quantities of the veneer log harvest going to local veneer plants for manufacture. This situation exists because the veneer log resources of a given state—species and supply—are not always compatible with the needs of local industry. For example, West Virginia veneer plants purchase hard maple and yellow birch from Vermont, white ash and black cherry from Pennsylvania, and yellow-poplar and gum from Maryland.

New York, Ohio, and Pennsylvania exported greater volumes of veneer logs than they imported from neighboring states for manufacture during 1976. More than 28 million board feet of veneer logs—representing 21 percent of the 1976 produc-

tion—were shipped outside the Northeast for manufacture. This represents an increase of 6 percentage points over 1972, when 19 million board feet were shipped outside the region. With the recent establishment of a softwood plywood plant in Canada that will utilize Maine timber as a portion of its log requirement, this uptrend will probably continue.

High Recovery of Plant Residues

Northeastern veneer plants generated over 12 million cubic feet of manufacturing residues in 1976. This total was made up of 6 million cubic feet of coarse woody material that was large enough to convert into wood chips, 4 million cubic feet of fine woody material that was too small to be chipped, and 2 million cubic feet of bark.

Most of the residue was used for boiler fuel at the veneer plants (Fig. 4). Thirty-seven percent of the coarse wood residues and 19 percent of the fine wood residues were converted to pulp and other fiber products. Twelve percent of the coarse wood residues, 26 percent of the fine wood residues, and 19 percent of the bark were not used. Most of this material was dumped, buried, or burned.

Industry Outlook

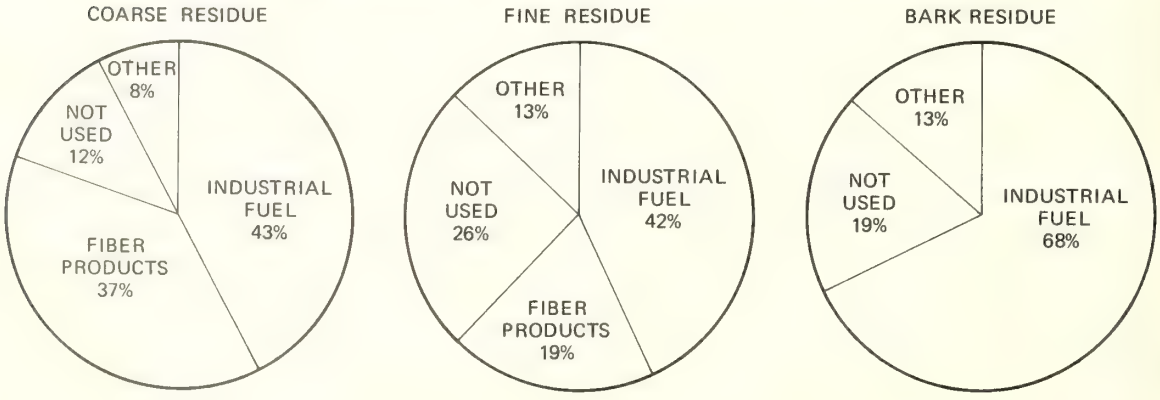
During the next 5 years certain segments of the veneer industry in the Northeast should do well, while other will continue to experience difficulties.

No improvement is expected for the container-veneer producers because long-term demand for wood containers is expected to diminish. Some container-veneer plants are expected to continue to operate because good substitutes for such items as mushroom baskets have not been forthcoming. Also, there will always be a demand for wooden novelty baskets along with other craftwork. Rising labor and material costs, however, along with the loss of major markets, have dampened the prospects for the future of this segment of the industry.

The specialty veneer segment of the industry depends on the superiority of its products over substitute items. Most of the specialty veneer manufacturers have been successful in holding their markets when challenged by competing products and materials. Because their markets are steady rather than growing, potential competitors are reluctant to expand into these nongrowth areas. Specialty veneer plants are located close to an adequate wood supply and have a wide range of marketing alternatives since they distribute their products nationwide. We believe that these manufacturers will be able to maintain or increase current production levels in the next half decade.

The face and commercial veneer segment of the industry is the most important segment since it uses twice as much volume of veneer logs as the specialty manufacturers and eight times as much as the container manufacturers. Future expansion of commercial veneer manufacturing in the Northeast will depend upon the industry's ability to compete for hardwood plywood markets with foreign imports and upon the general health of the domestic housing market. After dropping for two

Figure 4.—Disposition of veneer plant residues in percent, 1976.



Bones, James T. and David R. Dickson.
1978. **Veneer, 1976—A periodic assessment of regional timber output.** Northeast. For. Exp. Stn., Broomall, Pa.
13 p., illus. (U.S. Dep. Agric. For. Serv. Resour. Bull. NE-55)

A periodic assessment of regional timber output based upon a canvass of the veneer plants in the Northeast. Contains data about veneer-log production and receipts by states and species, log shipments between states and regions, and the disposition of the residues generated in the manufacture of veneer. Veneer log production between 1972 and 1976 increased 4 percent and northeastern veneer plant receipts decreased 2 percent. Trends in production and an outlook for the industry are presented along with a list of veneer plants in the Northeast.

792:832.2(74):721.1

Keywords: Timber output, veneer logs, Northeast, primary manufacturing residues.

Bones, James T. and David R. Dickson.
1978. **Veneer, 1976—A periodic assessment of regional timber output.** Northeast. For. Exp. Stn., Broomall, Pa.
13 p., illus. (U.S. Dep. Agric. For. Serv. Resour. Bull. NE-55)

A periodic assessment of regional timber output based upon a canvass of the veneer plants in the Northeast. Contains data about veneer-log production and receipts by states and species, log shipments between states and regions, and the disposition of the residues generated in the manufacture of veneer. Veneer log production between 1972 and 1976 increased 4 percent and northeastern veneer plant receipts decreased 2 percent. Trends in production and an outlook for the industry are presented along with a list of veneer plants in the Northeast.

792:832.2(74):721.1

Keywords: Timber output, veneer logs, Northeast, primary manufacturing residues.

Jones, James T. and David R. Dickson.
1978. **Veneer, 1976—A periodic assessment of regional timber output.** Northeast. For. Exp. Stn., Broomall, Pa.
13 p., illus. (U.S. Dep. Agric. For. Serv. Resour. Bull. NE-55)

A periodic assessment of regional timber output based upon a canvass of the veneer plants in the Northeast. Contains data about veneer-log production and receipts by states and species, log shipments between states and regions, and the disposition of the residues generated in the manufacture of veneer. Veneer log production between 1972 and 1976 increased 4 percent and northeastern veneer plant receipts decreased 2 percent. Trends in production and an outlook for the industry are presented along with a list of veneer plants in the Northeast.

792:832.2(74):721.1

Keywords: Timber output, veneer logs, Northeast, primary manufacturing residues.

Bones, James T. and David R. Dickson.
1978. **Veneer, 1976—A periodic assessment of regional timber output.** Northeast. For. Exp. Stn., Broomall, Pa.
13 p., illus. (U.S. Dep. Agric. For. Serv. Resour. Bull. NE-55)

A periodic assessment of regional timber output based upon a canvass of the veneer plants in the Northeast. Contains data about veneer-log production and receipts by states and species, log shipments between states and regions, and the disposition of the residues generated in the manufacture of veneer. Veneer log production between 1972 and 1976 increased 4 percent and northeastern veneer plant receipts decreased 2 percent. Trends in production and an outlook for the industry are presented along with a list of veneer plants in the Northeast.

792:832.2(74):721.1

Keywords: Timber output, veneer logs, Northeast, primary manufacturing residues.

years (1972 to 1974) U. S. imports of hardwood plywood began to increase and have climbed from about 3.5 billion square feet in 1974 to 4.7 billion square feet in 1976. U. S. shipments of domestically produced hardwood plywood trended upward in 1976 for the first time since 1972. Since most hardwood plywood is used in single-family homes and mobile homes, a good housing market is required for increased hardwood plywood and veneer demand. Housing starts have been climbing steadily since January 1, 1975, when a bottom of 900,000 starts was reached. In July 1977, housing starts rose to a seasonally adjusted annual rate of 2 million starts, which assures that hardwood plywood is in good demand. If annual housing starts stay above 1.8 million and foreign hardwood plywood imports stay below 5 billion square feet, market conditions should be favorable for domestically produced commercial and face veneer.

Northeastern hardwood plywood manufacturers agree that the quality of domestic logs is going down each year while log prices are rising. Hauling veneer-quality logs greater distances has also increased their cost. To meet the increased demand for high-quality veneer, many manufacturers are using a paper face that can be printed or a laminated film finish that simulates clear veneer. Between 1974 and 1976 the percentage of prefinished hardwood plywood shipments with a laminated film finish rose from 6.3 percent to 14.7 percent of total shipments.[1]

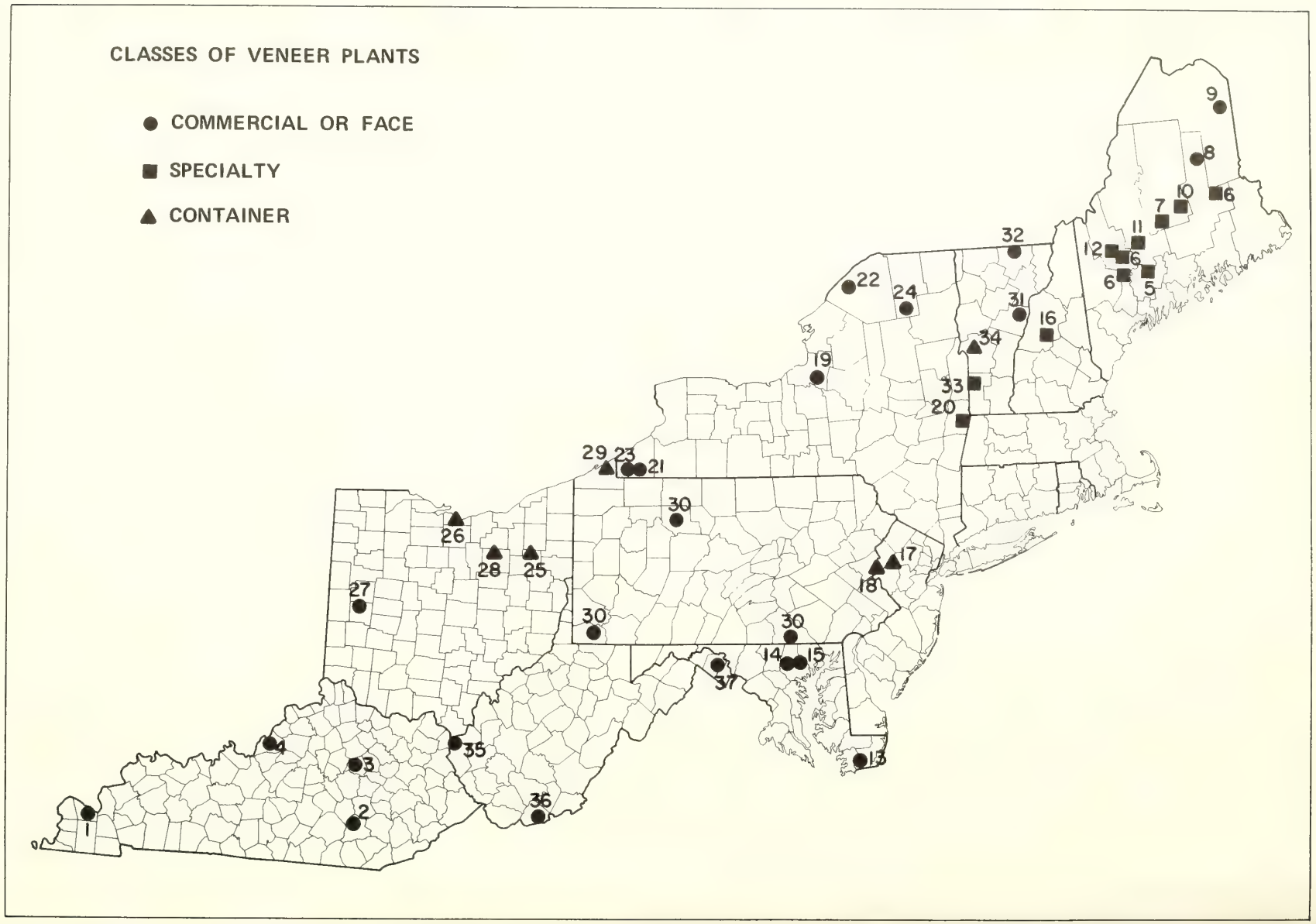
One result of the recent economic slowdown was a consolidation of the hardwood plywood industry in the Northeast and other parts of the United States. Because most of the new plant owners are multiregional and multinational corporations, they should be better equipped to gauge regional market demands and get the capital to make the acquired plants more efficient.

A new softwood structural plywood plant was constructed in New Brunswick, Canada, in 1976, very close to the Maine border. A portion of the plant's log requirement will be coming from the Maine timberlands. If successful, this plant could be the first of many to utilize northern softwoods in the manufacture of plywood.

[1]From data compiled by Clark E. McDonald, Managing Director, Hardwood Plywood Manufacturers Association.

ACKNOWLEDGMENT

The success of a survey depends upon the percentage of responses received from the population sampled and the effort put forth by the respondents in providing information. We are grateful to the Northeast's veneer industry for its timely and accurate responses. All veneer plants known to be operating in 1976 in the Northeast provided data for this report.


CLASSES OF VENEER PLANTS
COMMERCIAL OR FACE
SPECIALTY
CONTAINER

Veneer Plants in the Northeast — 1976

Kentucky

1 Central States Veneer Co., Paducah
2 Cumberland Forest Products Co., London
3 The Freeman Corp., Winchester
4 Wood Mosaic Corp., Louisville

Maine

5 Diamond International Corp., Oakland
6 Forster Manufacturing Co., Inc., Wilton
(Plants in E. Wilton, Mattawamkeag, and Strong)
7 Hardwood Products Co., Guilford
8 J. M. Huber Co., Patten
9 Indian Head Plywood Corp., Presque Isle
10 PCI Nationa, Brownville
11 Solon Manufacturing Co., Solon
12 Strong Wood Products Inc., Strong

Maryland

13 Chespeake Bay Plywood Corp., Pocomoke City
14 Stenerson Mahogany Corp., Cockeysville
15 Martin Veneer Co., Cockeysville

New Hampshire

16 USM Corp., Plymouth

New Jersey

17 Califon Basket Co., Califon
18 Rapp Package Co., Phillipsburg

New York

19 Koppers Co., Forest Products Division, Bernhard Bay
20 W. J. Cowee, Berlin
21 Knight Veneer and Panel Corp., Falconer
22 Riverside Veneer Corp., Heuvelton
23 Robbins Veneer Co., Falconer
24 Tupper Lake Veneer Corp., Tupper Lake

Ohio

25 Asplin Basket Co., Inc., Hartville
26 Berlin Fruit Box Co., Berlin Heights
27 Hartzell Industries, Inc., Piqua
28 McIntire Basket Co., Creston

Pennsylvania

29 Greenfield Basket Co., Northeast
30 Weyerhaeuser Co. (Plants in Jefferson, New Freedom, and Ridgway)

Vermont

31 Bradford Veneer and Panel Co., Bradford
32 Columbia Plywood Corp., Newport
33 Lewis Brothers Inc., West Rupert
34 Rutland Plywood Corp., Rutland

West Virginia

35 Breece Veneer Co., Kenova
36 The Dean Co., Princeton
37 Erath Veneer Corp., Martinsburg

Table 1.—Veneer log production and receipts in the Northeast, 1972 and 1976

State	Production			Receipts		
	1972	1976	Change	1972	1976	Change
	Million board feet[a]		*Percent*	*Million board feet*[a]		*Percent*
Connecticut	0.1	—	−100	—	—	—
Delaware	7.0	4.9	−30	(D)	(D)	(D)
Kentucky	5.6	5.1	−9	8.5	6.6	−22
Maine	38.0	40.3	+6	41.0	39.0	−5
Maryland	26.7	24.8	−7	30.1	25.5	−15
Massachusetts	.9	.8	−11	—	—	—
New Hampshire	2.1	4.3	+100	(D)	(D)	(D)
New Jersey	.7	1.0	+43	.9	(D)	−56
New York	13.1	16.1	+23	11.7	14.4	+23
Ohio	7.2	7.6	+6	7.0	3.7	−47
Pennsylvania	12.3	14.7	+20	7.4	10.7	+45
Rhode Island	—	—	—	—	—	—
Vermont	7.0	8.5	+21	10.4	18.2	+75
West Virginia	4.3	3.6	16	6.1	3.9	−36
All states	125.0	131.7	+5	123.3	122.9	[b]

[a] International ¼-inch rule. 1,000 board feet = 3.48 cubic meters.
[b] Less than 1 percent change.
(D) Data withheld to avoid disclosure for individual plants.

Table 2.—Species composition of veneer log harvest in the Northeast, 1972 and 1976

Species	1972		1976		Change
	Million board feet[a]	*Percent*	*Million board feet*[a]	*Percent*	*Percent*
Ash	0.6	0.5	1.6	1.2	[b]
Basswood	.7	.5	.3	.2	−57
Beech	9.0	7.2	11.7	8.9	+30
Birch	36.9	29.5	36.8	27.9	[c]
Cherry	2.7	2.2	3.4	2.6	+26
Cottonwood	1.2	1.0	.2	.2	−83
Elm	.7	.6	.2	.2	−71
Hickory	2.8	2.2	2.2	1.7	−21
Maple, hard	9.1	7.3	11.0	8.3	+21
Maple, soft	1.4	1.1	3.0	2.3	[b]
Oak, red	15.6	12.5	16.8	12.7	+8
Oak, white	3.4	2.7	7.1	5.4	[b]
Sycamore	.5	.4	.5	.4	[c]
Walnut, black	4.5	3.6	2.3	1.7	−49
Yellow-poplar	10.3	8.2	10.4	7.9	+1
Other hardwoods[d]	.2	.2	3.5	2.7	[b]
Total hardwoods	99.6	79.7	111.0	84.3	+11
Total softwoods	25.4	20.3	20.7	15.7	−19
All species	125.0	100.0	131.7	100.0	+5

[a] International ¼-inch log rule.
[b] More than 100 percent change.
[c] Less than 1 percent change.
[d] Includes aspen, sweetgum and black tupelo.

Table 3.—Production of veneer logs in the Northeast, by states and receiving plant classes, 1976

(Million board feet, International ¼-inch log rule)

State	Class of receiving veneer plant		
	Commercial and face	Container	Specialty
Connecticut	—	—	—
Delaware	4.8	0.1	—
Kentucky	4.8	.3	—
Maine	11.6	—	28.7
Maryland	17.4	6.9	.5
Massachusetts	—	—	.8
New Hampshire	2.4	—	1.9
New Jersey	.5	.5	—
New York	12.9	.1	3.1
Ohio	5.9	1.7	—
Pennsylvania	13.8	.9	—
Rhode Island	—	—	—
Vermont	2.1	6.3	.1
West Virginia	3.4	—	.2
All states	79.6	16.8	35.3

Table 4.—Receipts of veneer logs in the Northeast, by states and plant classes, 1976

(Million board feet, International ¼-inch log rule)

State[a]	Class of veneer plant		
	Commercial and face	Container	Specialty
Kentucky	6.6	—	—
Maine	7.8	—	31.2
Maryland	25.5	—	—
New Hampshire	(D)	(D)	(D)
New Jersey	(D)	(D)	(D)
New York	10.5	—	3.9
Ohio	2.0	1.7	—
Pennsylvania	10.6	.1	—
Vermont	10.4	7.7	.1
West Virginia	3.9	—	—
All states	77.3	9.9	35.7

[a] States with no operating veneer plants are omitted.

(D) Data withheld to avoid disclosure for individual plants.

Table 5.—Flow of veneer logs between states in the Northeast, 1976

(Million board feet, International ¼-inch log rule)

State	Production	Interstate shipments[a]		Apparent consumption
		Exports	Receipts	
Connecticut	—	—	—	—
Delaware	4.9	4.9	—	—
Kentucky	5.1	3.6	5.1	6.6
Maine	40.3	6.2	4.9	39.0
Maryland	24.8	9.0	9.7	25.5
Massachusetts	.8	.8	—	—
New Hampshire	4.3	(D)	(D)	(D)
New Jersey	1.0	(D)	(D)	(D)
New York	16.1	3.5	1.8	14.4
Ohio	7.6	5.3	1.4	3.7
Pennsylvania	14.7	8.1	4.1	10.7
Rhode Island	—	—	—	—
Vermont	8.5	.9	10.6	18.2
West Virginia	3.6	3.1	3.4	3.9
All states	131.7	—	—	122.9

[a] Includes shipments to and from Canada.
(D) Data withheld to avoid disclosure for individual plants.

Table 6.—Extraregional recipients of veneer logs from the Northeast, 1976

(Million board feet, International ¼-inch log rule)

State or Province	Volume received
Illinois	0.1
Indiana	7.5
Missouri	.2
North Carolina	8.4
Ontario, Canada	2.6
Quebec, Canada	4.3
Tennessee	1.1
Virginia	3.8
Iowa	.1
All states and provinces	28.1

Table 7.—Disposition of veneer plant residues in the Northeast by states, classes of residues, and types of use, 1976.

(In percent)

Class of residue and type of use	Kentucky	Maine	Maryland	New Hampshire	New Jersey	New York	Ohio	Pennsylvania	Vermont	West Virginia	All states
Coarse:[a]											
Fiber products	79	31	2	—	—	23	43	—	62	—	37
Industrial fuel	—	40	88	100	15	72	36	98	32	100	43
Domestic fuel	—	7	—	—	15	1	15	—	—	—	4
Other[b]	—	1	10	—	—	4	6	2	6	—	4
All uses	79	79	100	100	30	100	100	100	100	100	88
Not used	21	21	—	—	70	—	—	—	—	—	12
Fine:[c]											
Fiber products	—	28	—	—	—	—	11	—	22	—	19
Industrial fuel	77	21	90	100	30	100	45	95	38	100	42
Domestic fuel	—	—	—	—	—	—	22	—	—	—	1
Agricultural[d]	—	4	10	—	—	—	22	5	40	—	12
All uses	77	53	100	100	30	100	100	100	100	100	74
Not used	23	47	—	—	70	—	—	—	—	—	26
Bark:											
Industrial fuel	58	71	90	90	30	100	78	35	53	75	68
Agricultural	4	2	10	10	—	—	11	65	41	—	13
All uses	62	73	100	100	30	100	89	100	94	75	81
Not used	38	27	—	—	70	—	11	—	6	25	19

[a] Core and trimmings considered suitable for chipping.
[b] Includes small dimension and specialty items.
[c] Clipping and rounding waste considered unsuitable for chipping.
[d] Includes chicken litter, livestock bedding, and mulch.

Headquarters of the Northeastern Forest Experiment Station are in Broomall, Pa. Field laboratories and research units are maintained at:

- Beltsville, Maryland.
- Berea, Kentucky, in cooperation with Berea College.
- Burlington, Vermont, in cooperation with the University of Vermont.
- Delaware, Ohio.
- Durham, New Hampshire, in cooperation with the University of New Hampshire.
- Hamden, Connecticut, in cooperation with Yale University.
- Kingston, Pennsylvania.
- Morgantown, West Virginia, in cooperation with West Virginia University, Morgantown.
- Orono, Maine, in cooperation with the University of Maine, Orono.
- Parsons, West Virginia.
- Pennington, New Jersey.
- Princeton, West Virginia.
- Syracuse, New York, in cooperation with the State University of New York College of Environmental Sciences and Forestry at Syracuse University, Syracuse.
- Warren, Pennsylvania.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1978—703-112:4

GOVT. DOCUMENTS
DEPOSITORY ITEM
NOV 8 1978
CLEMSON
LIBRARY

The FOREST RESOURCES of WEST VIRGINIA

FOREST SERVICE RESOURCE BULLETIN NE-56
1978

FOREST SERVICE, U. S. DEPARTMENT OF AGRICULTURE
NORTHEASTERN FOREST EXPERIMENT STATION
370 REED ROAD, BROOMALL, PA 19008

FOREWORD

Under the authority of the McSweeney-McNary Forest Research Act of May 22, 1928, and subsequent amendments, the Forest Service, U. S. Department of Agriculture, conducts a series of continuing forest surveys of all states to provide up-to-date information about the forest resources of the Nation.

This is a report on the latest forest survey of West Virginia. It supersedes two previous reports published in 1952 and 1964. The Northeastern Forest Experiment Station staff during this most recent effort had the excellent help and cooperation of the West Virginia Department of Natural Resources.

The resurvey of the State was directed by Carl E. Mayer, Resources Evaluation Project Leader. He was assisted by Joseph E. Barnard, who was responsible for the design of the inventory and sample selection as well as for supervision of data compilation. John R. Peters supervised the photo interpretation and the data collection by field crews. David R. Dickson applied the generalized data processing system, FINSYS, to the specific data needs of the West Virginia inventory and produced summary tables for the State and by counties and units. Teresa M. Bowers assisted in the inventory design by performing all the calculations necessary for sample-size determination and plot selection. She was responsible for the coordination of key-punching and other data-preparation tasks and the final preparation and statistical checking of tables for the report. James T. Bones, with the assistance of State personnel, collected and compiled the data on current utilization levels, timber products output, and harvesting and manufacturing residues. He was assisted in the compilation phase by David R. Dickson and Teresa M. Bowers. Carmela M. Hyland was responsible for administrative and secretarial services.

This report summarizes the forest resource situation and the changes that have occurred since the previous inventory. Data for the Monongahela National Forest were supplied by the forest and updated for inclusion in the report. Those who need more detailed information or analysis than is presented herein should contact the Resources Evaluation project, Northeastern Forest Experiment Station, 370 Reed Road, Broomall, Pennsylvania 19008. Users of this report are strongly advised to read carefully the definitions of forest survey terms and the section on the reliability of the estimates in the appendix of this report.

COVER PHOTO: Kanawha Falls at the headwaters of the historic Kanawha River (Courtesy of Wonderful West Virginia Magazine).

by James T. Bones

The FOREST RESOURCES of WEST VIRGINIA

CONTENTS

INTRODUCTION. 1
Three geographic units 2
Sampling the resource. 3
SIGNIFICANT FINDINGS. 3
Forest area 3
Timber volume 3
Stand conditions. 3
Timber use 3
Other natural resources 4
TIMBER RESOURCE SITUATION. 4
More than 75 percent in forest cover. 4
A 24 percent volume increase 7
Grade 3 hardwood logs predominate 9
GROWTH IS TWICE REMOVALS 10
Removals decreased; growth increased 10
TIMBER-PRODUCTS OUTPUT 12
Lumber and sawlog production declined. 13
Round pulpwood production down; residue chip production up 14
Most other products come from hardwoods . . . 14
TIMBER SUPPLY OUTLOOK 15
Thirty years from now 15
Harvesting the growth 17
Inventory versus timber supply. 18
OTHER NATURAL RESOURCES. 18
The land—its use and management. 18
Water supply is adequate; quality is a continuing problem 21
Outdoor recreation increasing in importance . . 22
Wildlife resource is varied. 24
Fish resource management 28
RESOURCE MANAGEMENT OPPORTUNITIES. 31
LITERATURE CITED AND RESOURCE REFERENCES 32
APPENDIX. 33
Definition of terms 33
Previous inventories 40
The 1973-74 inventory. 41
County data 41
Data processing. 41
Comparisons between inventories 41
Reliability of the estimates 42
Commercial tree species of West Virginia 43
Metric equivalents of units used in this report . . 44
Index to statistical tables for the State. 45
Forest land 45
Timber volume 45
Annual growth, removals, and mortality . . . 45
Output of timber products (by softwoods and hardwoods) 45
Statistical tables for geographic units 46
Forest land 46
Timber volume 46
Annual growth and removals 46
Statistical tables for counties 46
Forest land 46
Timber volume 46

Mountain State overview (Courtesy of Wonderful West Virginia Magazine).

Abstract

A statistical and analytical report of the third forest survey of West Virginia by the Forest Service, U. S. Department of Agriculture. Findings are based on the remeasurement of 1/5-acre plots and new 10-point cluster plots. This report analyzes trends in forest land area, timber volume, annual growth, and timber removals. Timber products output by forest industries, based upon a canvass of industries in 1974, and the importance of timber and forests to the State's economy and environment are also discussed. The report includes a discussion of the outlook for timber supplies during the next 30 years, a discussion of resource management opportunities, and 65 tables of statistical data.

INTRODUCTION

THIS REPORT PRESENTS a discussion and analysis of the results of the third forest survey of West Virginia, completed in 1975. The first forest survey of West Virginia was begun in 1948 (Wray 1952) and the second in 1959 (Ferguson 1964). Through the years many definitions, procedures, and methods have changed as a result of improved forest-inventory and data processing techniques. To analyze actual trends between forest surveys, the estimates from the previous survey were adjusted to make them comparable with those of the current survey. The 1949 and 1961 estimates are valid for the procedures and definitions used then. The changes in commercial forest area and in growing-stock and sawtimber volume, after adjustment of the 1961 data to current standards, are:

CHANGE IN AREA AND VOLUME, 1961-1975

	1961	*1975*	*Change*
Commercial forest land (thousand acres)	11,389.0	11,483.7	+94.7
Growing-stock volume (million cubic feet)			
Softwoods	557.0	995.0	+438.0
Hardwoods	10,320.0	12,520.4	+2,200.4
Total	10,877.0	13,515.4	+2,638.4
Sawtimber volume (million board feet)			
Softwoods	1,378.0	2,599.7	+1,221.7
Hardwoods	20,560.0	25,031.1	+4,471.1
Total	21,938.0	27,630.8	+5,692.8

This report summarizes the present timber-resource situation and highlights some of the changes that have taken place between surveys. Trends in the inventory and the timber supply are discussed and the future supply is projected. In addition, other important natural resources of West Virginia are identified and analyzed in the light of future user requirements and their compatability with other resource uses.

Three geographic units

To obtain data other than state totals, the State was divided into three geographic sampling units for the current resurvey. These units consist of from 14 to 22 counties; each unit was treated as a homogeneous entity for sampling. The amount of commercial forest land in the three units ranges from 3 to 4.4 million acres.

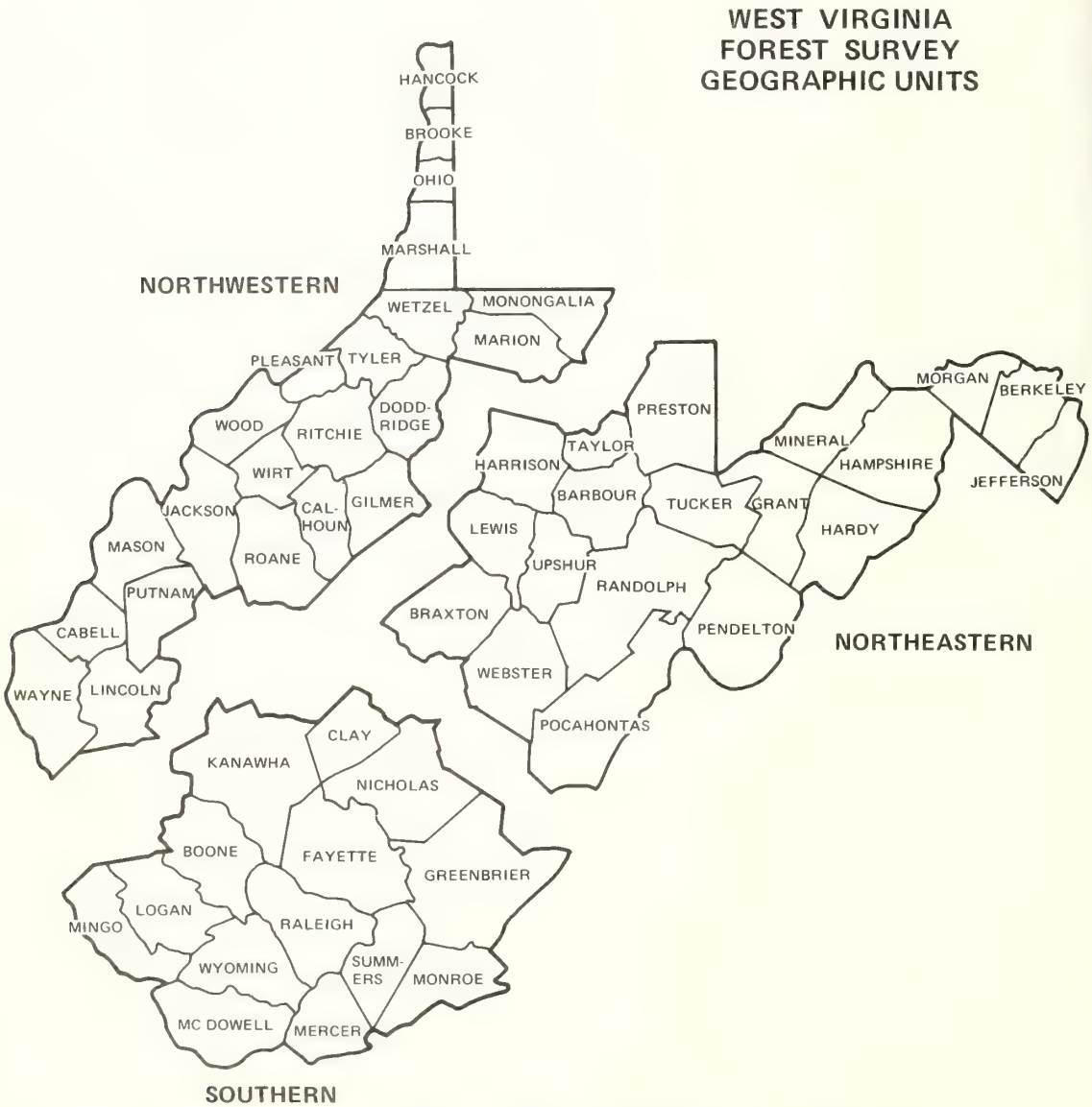


Figure 1.—Forest-survey geographic sampling units in West Virginia.

In the initial forest survey, seven sampling units with irregular boundaries were recognized. During the 1961 forest survey, although the three current geographic units were identified, the national forests were carried as a fourth separate unit. We plan to use the three geographic units defined for this reinventory as the basic units for future surveys, to permit comparisons of trends at less than the statewide level.

Sampling the resource

In the current resurvey a large number of the original 1949 field plots were remeasured to provide estimates of average annual net timber growth, average annual timber removals, and land-use change, and to update the 1949 forest inventory volume estimates. To develop an independent second estimate, new field plots were established and measured. These two samples yielded independent estimates, which were weighted and combined to give current estimates of forest area and timber volume. A more detailed discussion of the design and sampling procedure is included in the appendix.

Sampling errors, which indicate the reliability of the estimates, are presented in the appendix and as columns in the individual tables. Users of these timber-resource data are strongly advised to read the definitions and explanations of these statistics carefully.

SIGNIFICANT FINDINGS

Forest area

- The forest area is 11.6 million acres, 75 percent of the land area in the State. Only 1 percent of the total forest area is classed as productive reserved or unproductive forest land.
- The commercial forest area has increased 16 percent, from 9.9 million acres in 1949 to 11.5 in 1975. Reversion of pastureland to forest cover is responsible for much of the increase.
- Sawtimber stands occupy 44 percent of the commercial forest land and private landowners own 89 percent of the sawtimber area.
- Oak-hickory is the principal forest type; it covers 59 percent of the commercial forest.

Timber volume

- There are 15.6 billion cubic feet of timber in the commercial forests of the State, 87 percent of which is in growing-stock trees.
- More than 84 percent of the 13.5 billion cubic feet of growing stock and 83 percent of the 27.6 billion board feet of sawtimber on commercial forest land is privately owned.
- Oaks account for 40 percent of the growing-stock volume and 43 percent of the sawtimber volume.
- Total growing-stock volume has increased 24 percent from 10.9 billion cubic feet in 1961 to 13.5 billion cubic feet in 1975.

Stand conditions

- Eighty-two percent of the commercial forest land is fully stocked with live trees, but only 30 percent is fully stocked with growing-stock trees.
- One in every four hardwood trees and one in every eight softwood trees is considered unmerchantable because it is grossly defective, poorly formed, or of a noncommercial species.
- The volume of hardwood sawtimber in grade 3 logs has increased from 37 percent of the total in 1949 to 46 percent in 1975. An increase in the volume in 12- and 14-inch dbh trees is responsible for much of this increase.
- During the last 14 years average annual net growth has been more than twice average annual removals for both growing stock and sawtimber in West Virginia.

Timber use

- Total output of timber products in 1974 was 136.2 million cubic feet, 81 percent of which was from round timber.
- Eighty-three percent of the timber products output in 1974 was from hardwood growing-stock trees and nearly two-thirds of the timber harvest went to sawmills for lumber.
- West Virginia has no pulpmills, but 213,600 cords of pulpwood were harvested and 198,500 cord equivalents of chipped manufacturing residues were recovered and shipped to pulpmills in neighboring states in 1974.
- Total-tree harvesting systems are operating successfully in the State; about 3 percent of the pulpwood harvest came from total-tree chips.

Other natural resources

- The water supply is adequate, at the current level of consumption, but water quality is of increasing concern to local resource managers.
- Demand for wildlife resources has been growing; an estimated 296,000 licensed hunters and 304,000 licensed fishermen will be using the resource by the year 2000.
- Current land use trends favor increasing populations of gray squirrels, wild turkeys, and warm water fish, and declining populations of white-tailed deer, bobwhite quail, and trout.

TIMBER RESOURCE SITUATION

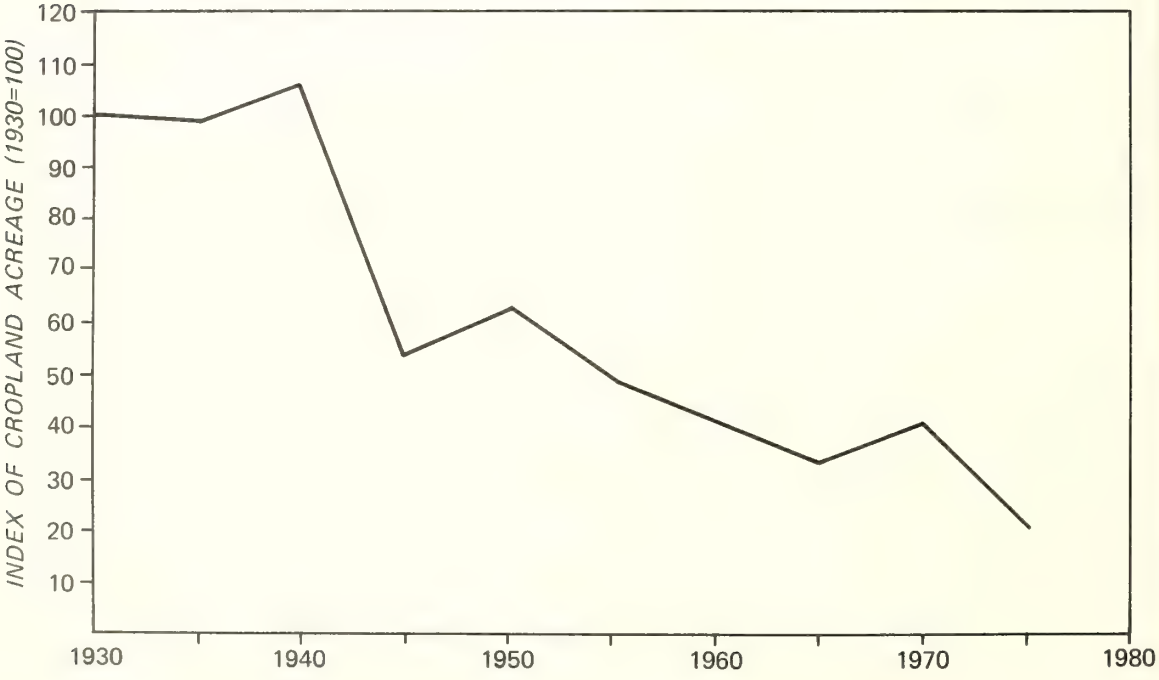
More than 75 percent in forest cover

More than 75 percent of the land area of West Virginia is covered by forests. Of the remaining 25 percent, nearly 4 percent of the total land area is classed as cropland and 9 percent is classed as pasture. The balance of the nonforest land is in swampland, and industrial and urban areas. The 11.5 million areas of land that support forests of commercial value in West Virginia represents 74 percent of the total land area.

Land-use changes between the present forest survey and the 1949 and 1961 surveys resulted in a 16 percent overall increase in commercial forest acreage. Area increased from about 9.9 million acres in 1949 to 11.4 million acres in 1961, and finally to 11.5 million acres in 1975. Cropland acreage decreased by 1,096,000 acres between 1950 and 1974 (Fig. 2). This decrease was considered significant, since most of this loss represents a permanent redirection of land into such irreversible uses as highways and residential and commercial development. The loss in acreage of pastureland between 1949 and 1975 was approximately equal to the gain in commercial forest land. Apparently one product of increased fire protection and a decline in family farming during the last quarter century was the reversion of about 2 million acres of pastureland to forest cover in West Virginia.

Most of the gain in commercial forest land acreage has occurred in the Northeastern and Northwestern geographic units of the State. These changes in the three geographic units and the national forest land are:

Figure 2.—Change in cropland acreage in West Virginia since 1930.



The land-use change brought on by the federal highway construction program in West Virginia during the past decade typifies those irreversible changes that permanently reduce the commercial forest land base.

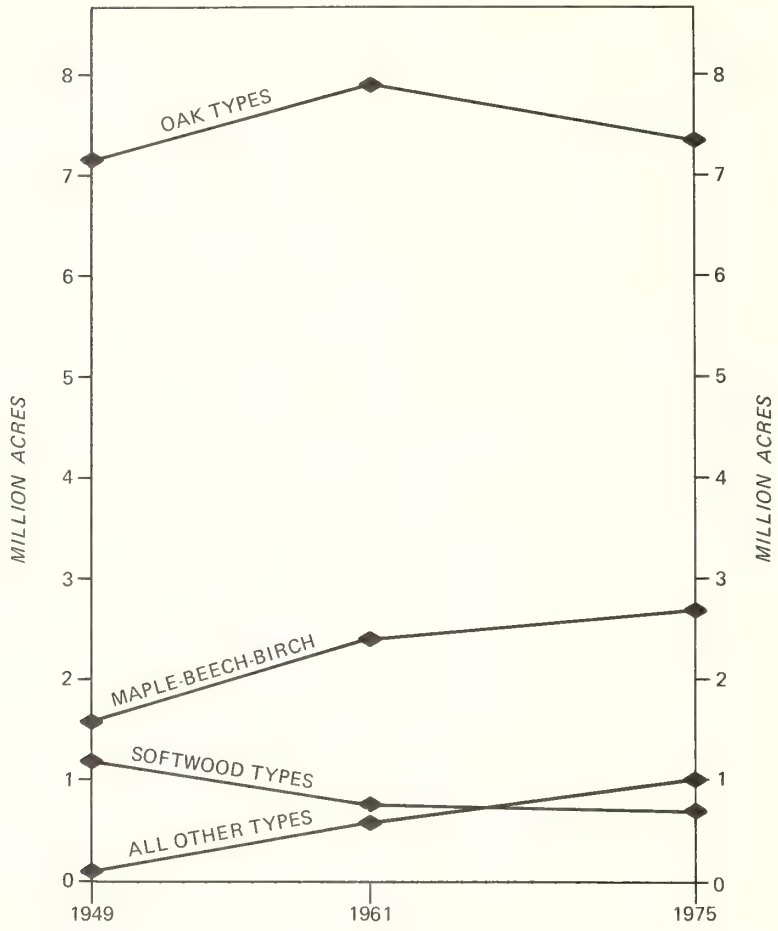
Unit	*1949*	*1961*	*1975*
	(million acres)		
National forest land	0.9	0.9	0.9
Northeastern Unit	3.0	3.4	3.6
Southern Unit	3.7	4.0	3.8
Northwestern Unit	2.3	3.1	3.2
State total	9.9	11.4	11.5

The area of forest classed as sawtimber has risen slightly since 1949, but it has decreased since 1961 from 5.6 million acres to 5.1 million acres. The comparison of stand area in sawtimber between the 1961 and 1975 resurveys represents a true difference, since the definition of sawtimber stands remained the same. In 1949, however, sawtimber stands were segregated on a volume-per-acre base rather than by area occupancy. The area in poletimber stands increased between 1961 and 1975 by nearly 0.9 million acres, while the acreage in seedling and sapling stands remained more or less unchanged. The area in stands of all size classes but sawtimber increased on public lands in West Virginia between surveys, while area in all size classes but poletimber decreased on private lands.

A forest type classification was used during the survey that segregated commercial forest area into 24 local types. These local types were in turn aggregated into 8 major types. Since the forest type classification system used during the previous forest survey is consistent with the current one, the differences in the acreage of the various types between surveys represent true differences.

Overall, since 1949, the area in hardwood types has increased and the area in softwood types has decreased (Fig. 3). Although the commercial forest land area increased 16 percent between 1949 and 1975, the area in the spruce-fir and Virginia and pitch pine types decreased about 44 percent.

Figure 3.—Changes in commercial forest area, by forest types, 1949-1975.

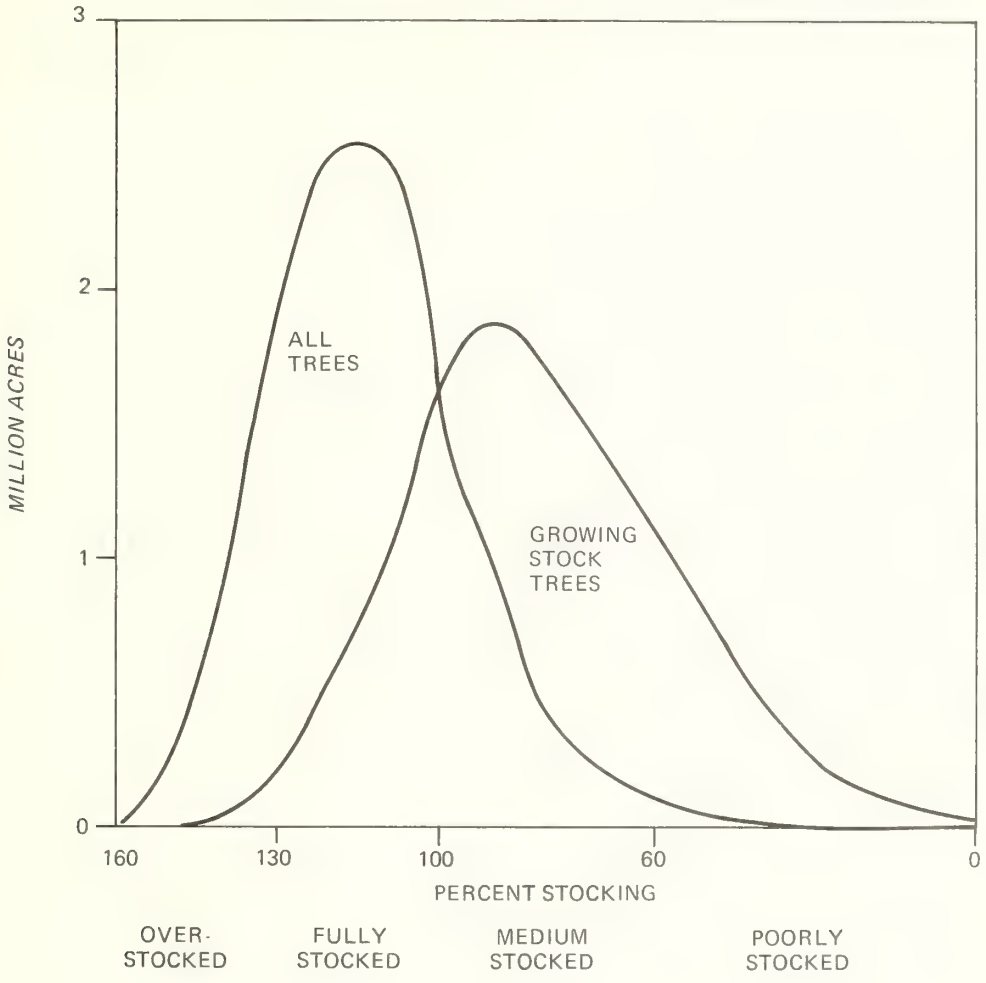


This significant reduction in softwood area has been partially offset by an increase in the acreage in the white and red pine type from 71,000 acres in 1949 to 101,000 acres in 1975. In West Virginia this type contains the white pine and hemlock local forest types.

During the period the acreage in the oak-hickory type, which occupies 60 percent of the total commercial forest area, has remained virtually the same. The maple-beech-birch type and the oak-pine type, however, have expanded to sites that were once occupied by softwood types. Flood protection along with control of land use along many of West Virginia's major rivers and streams during the 1950's has resulted in an increase in the acreage of the elm-ash-cottonwood type from 27,000 acres in 1949 to 815,000 acres in 1975. A major component of this type is red maple.

We consider an acre fully stocked if it contains 75 to 100 square feet of basal area. By this standard, 82 percent of the area of commercial forest land was either fully stocked or overstocked with live trees in 1975 (Fig. 4). At first glance such a high percentage of the total growing space being 100 percent or more stocked would seem to indicate that the forested acreage is being extremely well utilized. However, only 30 percent of the area of commercial forest land is considered to be fully stocked or overstocked with growing-stock trees. This means that defective and poorly formed trees—those classed as rough or rotten—are a large enough component in 52 percent of the stands to exclude them from the fully stocked category. One in every four hardwood trees and one in every eight softwood trees is either poorly formed, highly defective, or of a noncommercial species.

Figure 4.—Area of commercial forest by stocking classes, 1975.



A 24 percent volume increase

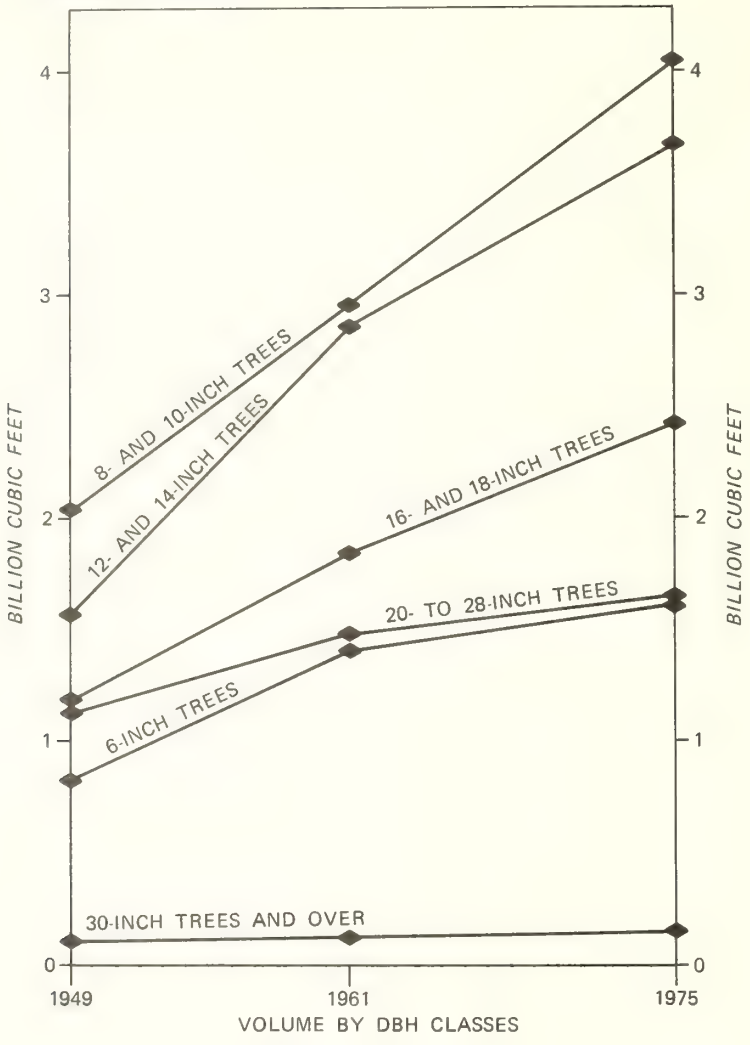
The total volume of growing stock (all commercial tree species 5.0 inches dbh and larger) rose from 10.9 billion cubic feet in 1961 to 13.5 billion in 1975—a 24 percent increase. However, this increase was not evenly distributed among species groups or diameter classes. Softwood volume gained 79 percent during the period, while hardwood volume gained only 21 percent. The cubic-foot volume in the 6- to 10-inch dbh and 12- to 18-inch dbh classes rose 27 percent each, while the volume in 20- to 28-inch dbh trees rose only 8 percent (Fig. 5). Highest individual volume gain was in the 10-inch dbh class—40 percent.

The uneven distribution of tree sizes and the high incidence of defect is reflected in the sawtimber trend. The volume in sawtimber trees (growing-stock trees 9.0 inches dbh and larger for softwood and 11.0 inches and larger for hardwoods) increased 26 percent—from 21.9 to 27.6 billion board feet. The volume in sawtimber trees 10 to 18 inches dbh increased 34 percent, but the volume in trees 20 inches dbh and larger increased only 6 percent.

In addition to the 13.5 billion cubic feet of growing stock, there is nearly 1.4 billion cubic feet of sound wood in rough rees and 613 million cubic feet in rotten trees on commercial forest land. This wood is available for recovery and use in fiber products even though the trees are classified as too crooked or too rotten to be used for such solid-wood products as lumber or veneer.

The volume of growing stock per acre rose from 955 cubic feet in 1961 to 1,177 cubic feet in 1975. The average volume of sawtimber per acre in-

Figure 5.—Volume of growing stock by diameter classes, 1949-1975.



creased from 1,926 board feet in 1961 to 2,406 board feet in 1975. On national forest lands both growing stock and sawtimber volumes per acre increased. Average volumes per acre are 2,162 cubic feet and 4,791 board feet, well above the statewide average for all ownerships. Likewise, average volumes per acre for forest industry ownerships rose to 1,339 cubic feet and 3,144 board feet. All other public and private ownerships had per-acre volumes that were well below the state averages.

Together, the high per-acre volumes on land in forest industry and national forest ownership in West Virginia account for only 23 percent of the growing stock and 25 percent of the sawtimber volume. Seventy-seven percent of the growing-stock volume and 75 percent of the sawtimber volume is controlled by private corporations and individuals not primarily engaged in timber activities, and by farmers. Since 1961, the growing-stock volume on farmer and miscellaneous private ownerships has increased 1.6 billion cubic feet, from 8.6 billion cubic feet to 10.2 billion in 1975. Sawtimber volume increased 2.5 billion board feet; from 17.6 billion board feet in 1961 to 20.1 billion board feet in 1975. In contrast, total sawtimber volume on public land has increased 1.6 billion board feet, from 3.1 billion board feet to 4.7 billion board feet. Sawtimber volume on forest

industry ownerships has increased 1.6 billion board feet, from 1.2 billion board feet to 2.8 billion board feet during the same period.

Grade 3 hardwood logs predominate

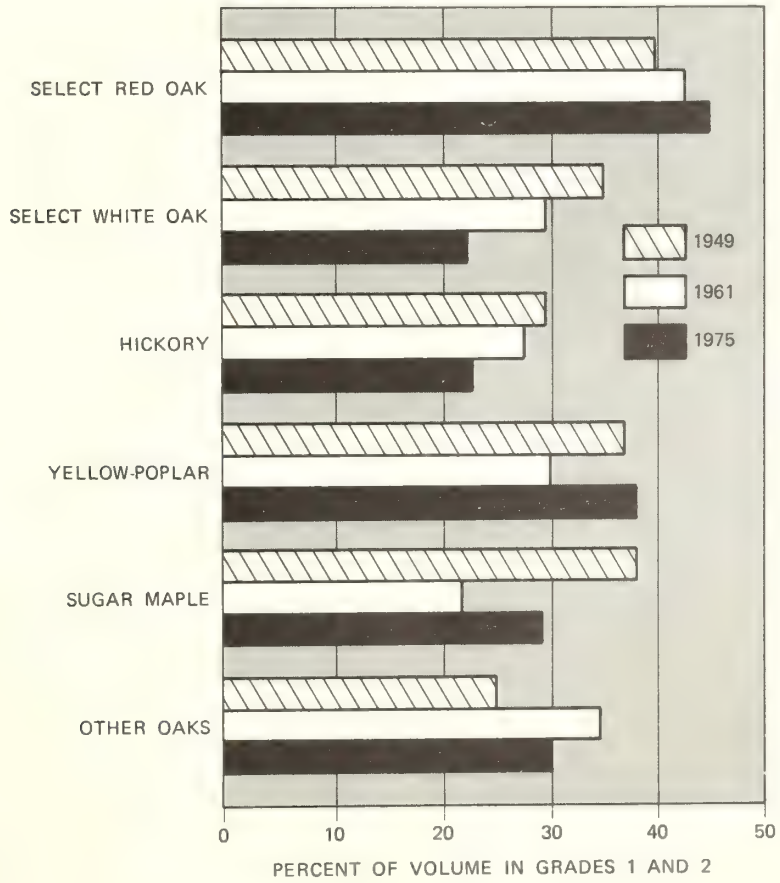
The volume of hardwood sawlogs that met the minimum specifications of the grading rule has increased during the past quarter-century, but most of the increase was in the low-quality grade 3 logs. The following tabulation gives the change in distribution of volume by hardwood log grades for the three inventory years (in percent).

	1949	*1961*	*1975*
Log grade 1	34	10	14
Log grade 2		20	17
Log grade 3	37	45	46
Timber and tie logs	29	25	23

The increase in volume of grade 3 hardwood sawlogs appears to be directly related to a substantial increase in the volume in 12- and 14-inch dbh trees. The log grade rules for hardwood logs usually exclude 12- and 14-inch dbh trees from grade 1, because a grade 1 log must have a minimum diameter of 13 inches inside bark at the small end. It is highly unlikely that a tree with a 14-inch dbh could contain such a log. This restriction, along with the prevalence of live branches on young trees, would tend to lower present sawlog quality. Public forest lands, with their higher per-acre volumes and larger trees, have a higher percentage of grade 1 and grade 2 hardwood volume. Thirty-nine percent of the board-foot volume in hardwood sawtimber trees on the Monongahela National Forest in 1975 was in grade 1 and 2 logs, compared to 31 percent for the State as a whole.

The percentage of volume in grades 1 and 2 hardwood logs has varied among species during the last quarter-century (Fig. 6). The overall qual-

Figure 6.—Quality of hardwood sawtimber.



ity of select white oaks and hickory has tended to decline since 1949, while the quality of select red oaks has improved. In yellow-poplar and sugar maple, quality change has been mixed, but since 1961 the percentage of volume in the better log grades has increased.

Pines were the only softwoods graded for sawlog quality. Only 11 percent of the total pine volume was in grade 1 and 2 sawlog material in 1975.

GROWTH IS TWICE REMOVALS

Growth and removal of timber from the inventory can be considered in several ways. When it is necessary to understand how the inventory changed we discuss the average annual growth and removals (Table 20). This is the estimated volume of growth or removals for a hypothetical average year during the period between inventories. In other cases it is necessary to ask: Is growth or removal for the inventory year representative of the average, or of the trend during the period between inventories? To answer this question we compare the average annual growth or removals with the current (Table 21) or actual (Table 27) level for the inventory year. The volume of growth or removals that would be consistent with the average over the period is called trend-level growth or removal. By comparing this estimate, say for removal, with the reported volume actually removed we can determine whether the inventory year was typical of the trend or higher or lower than the trend. This comparison can be very important in predicting or projecting future timber removals.

Growing-stock volume increased 6.4 billion cubic feet between 1949 and 1961 and 2.6 billion cubic feet between 1961 and 1975, to a total of 13.5 billion cubic feet in 1975. This volume increased because timber removals were less than net growth between inventories—an average annual net change of 188 million cubic feet between 1960 and 1974. Sawtimber volume increased 10.1 billion board feet between 1949 and 1975 to 27.6 billion board feet. Total sawtimber removals were about half of net growth, and the average annual change between 1960 and 1974 was 407 million board feet.

Although annual change in growing stock and sawtimber volume is equal to the difference between net growth and removals, net growth can also be divided into several components. The first two are accretion (growth on the initial inventory) and ingrowth (growth of trees that attain poletimber size between inventories). The sum of these two items is termed gross growth. Net growth is gross growth minus certain losses in merchantability (cull-tree increment and growing stock mortality). Foresters attempt to minimize these two negative growth components through forest management. An unusual change in any of the components of growth can cause substantial changes in the average annual change in the inventory over time. Disease and insect attacks may substantially increase mortality and cull increment. Increased market demand for certain tree species may result in a decreased timber supply of that species.

Because of changes in procedure since 1949, the components of annual change in the inventory can be separated only for the 1960-1974 period. For most species in West Virginia, ingrowth is an important component. Ingrowth made up 43 percent of the average annual gross growth of growing stock. It accounts for such a large portion of the gross growth because of the long period between surveys. The concentration of timber removals in large-diameter trees also affects ingrowth. In 20-inch dbh and larger trees the volume removed was 5 times the net annual growth during the period.

Ingrowth volume of growing-stock trees that grew into the sawtimber class made up 55 percent of the average annual gross growth in sawtimber trees. The volume of trees that died or became cull reduced the gross growth in sawtimber by only 19 percent. Average annual net growth of 664 million board feet exceeded the average annual removals by 407 million board feet.

Removals decreased; growth increased

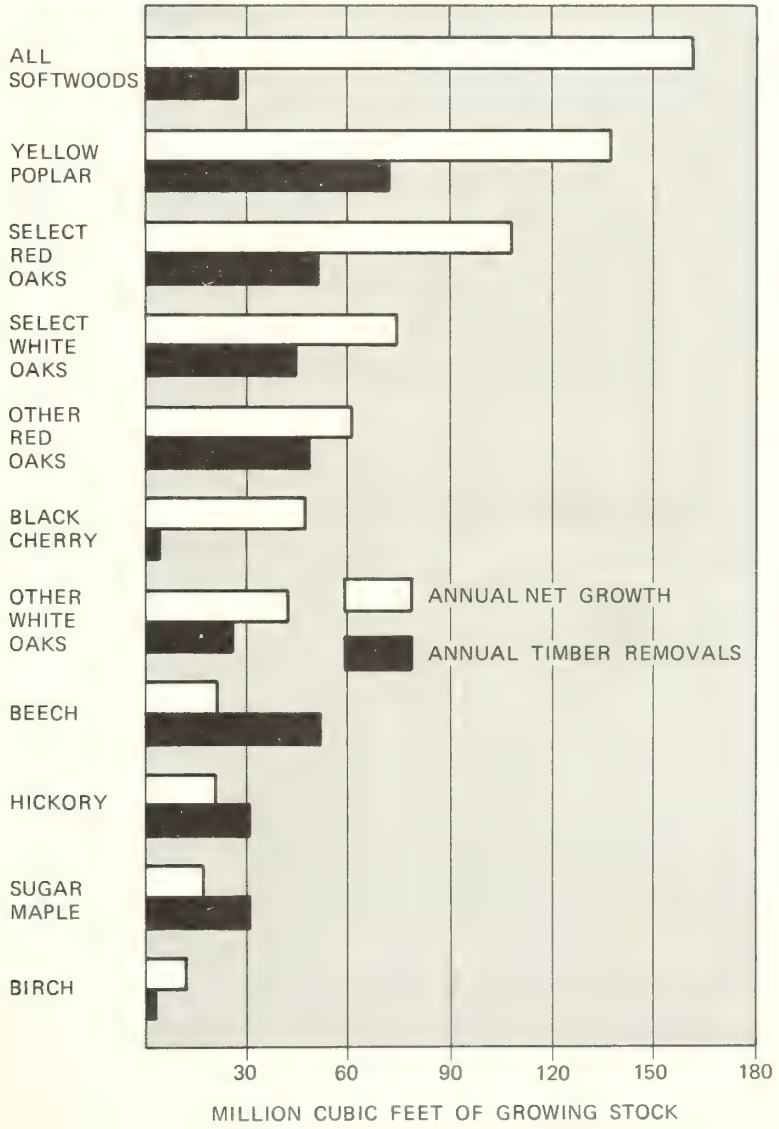
Analysis of the changes that are taking place in the timber inventory of West Virginia shows that removals declined faster than annual net growth increased, but only because of a severe decline in softwood removals between 1949 and 1974. Hardwood removals actually increased during the period from 148 million cubic feet to 155.5 million cubic feet. Softwood removals declined from nearly 13.9 million cubic feet in 1949 to over 10.6 million cubic feet in 1974. Timber removals of growing stock were 35 percent of annual net growth in 1974, compared to 41 percent in 1949.

Even though the rate of decrease for timber removals is greater than the rate of increase of annual net growth for all species together, for certain species more timber could be harvested if markets were available, and for other species the inventory is being depleted because current removals exceed net growth.

The hardwood growing stock situation differs from that of softwoods. The annual net growth of hardwoods in 1974 was 415 million cubic feet, 3.3 percent of the hardwood inventory. Hardwood removals in 1974 (155 million cubic feet) were 37 percent of the net growth. In contrast, the annual net growth of softwood growing stock in 1974 was 59 million cubic feet, 5.9 percent of the inventory. Softwood removals in 1974 (10.6 million cubic feet) were only 18 percent of the net growth.

The oaks had the greatest combined volume of net growth—161 million cubic feet. Together they accounted for 39 percent of the total hardwood net growth in 1974. Timber removals for oak were 65 million cubic feet, 42 percent of the total hardwood removals. The ratio of sawtimber removals to net growth differed between groups of oaks (Fig. 7). For select red and white oaks, more than half of the sawtimber growth was removed in

Figure 7.—Annual net growth and timber removals, by species, West Virginia, 1975.



1974. More than three-fifths of the other white oak sawtimber growth and 79 percent of the other red oak sawtimber growth was removed in 1974. Sawtimber removals exceeded net growth for several other important hardwood species including sugar maple, hickory, and beech.

Yellow-poplar had the greatest volume of growing-stock growth and sawtimber growth in 1974. The 78 million cubic feet and 139 million board feet represented 19 percent of the total hardwood growing stock and 21 percent of the total hardwood sawtimber. Yellow-poplar removals represented only 35 percent of the growing-stock growth and 52 percent of sawtimber growth in 1974.

Growing stock removals and net growth also differed among geographic units in 1974. Although removals averaged 35 percent of the net growth for the entire State, removals ranged from 17 percent of net growth in the Northwestern Unit to 57 percent of net growth in the Southern Unit. Sawtimber removals also varied widely in production of net growth. The ratio of sawtimber removals to net growth ranged from 30 percent in the Northwestern Unit to 106 percent in the Southern Geographic Unit. The high proportion of industrial land in the Southern Unit probably explains the near balance in growth and removals, since this is where much of the timber harvesting in West Virginia is concentrated.

TIMBER-PRODUCTS OUTPUT

Timber removals were compiled in two different ways during the resurvey. The statistics on timber removals in Table 27 were gathered during an independent industry survey and reflect timber removals for one year—1974. Total removals for 1974 can be divided into timber products output (Tables 25 and 26); logging residue that was generated by the harvest of 99 million cubic feet of roundwood products in 1974; and other removals, which include nonindustrial timber harvesting and timber that was administratively withdrawn from timber production during the year.

A second estimate of timber removals was developed from the remeasurement of permanent sample plots. These current annual removals (Tables 21 and 22) are used for making growth and removal trend comparisons and are considered more accurate for assessing the changes in the timber inventory since 1961.

Data for timber products were gathered during a complete canvass of primary wood manufacturers that operated in West Virginia in 1974. Utilization studies were conducted concurrent with logging operations withing the State. Data from these sources, and from regionwide production surveys that are conducted annually, were used to analyze the 1974 timber harvest and output of timber products.

The production of timber products from all sources totaled 136 million cubic feet in 1974. This volume represented a 5 percent increase in total output from the 130 million cubic feet reported in 1960. Sources of the 1974 timber-products output and their volumes are:

	Million cubic feet	*Percent*
Growing-stock volume:		
Softwoods	8.2	6
Hardwoods	91.3	67
Total	99.5	73
Other volume	10.2	8
Total roundwood	109.7	81
Plant byproduct volume	26.5	19
Total output	136.2	100

Other sources in the above tabulation include utilized volume from trees less than 5.0 inches in diameter, tree tops and limbs from commercial forest areas, and any material from noncommercial forest land or nonforest land such as fence rows and suburban areas.

Softwoods made up 10 percent of the total output volume and 11 percent of the roundwood output (11.8 million cubic feet). Hardwoods made up 90 percent of the total output volume and 89 percent of the roundwood output (97.9 million cubic feet). Compared to 1960, softwood output from roundwood increased by almost 25 percent while the corresponding hardwood output decreased by 1 percent.

Changes in roundwood production between 1960 and 1974 by products and species groups are very pronounced. Total sawlog volume increased 23 percent to 72.2 million cubic feet, aided by a 34 percent increase in softwood sawlog production. Roundwood production for pulpwood decreased

about 8 percent to 18.2 million cubic feet. Although softwood pulpwood production decreased abut 38 percent, hardwood production increased about 9 percent. Veneer, cooperage, and posts were the only other timber products that increased in volume, but together they made up less than 3 percent of the total roundwood production in 1974. The changes in industrial roundwood production are shown in greater detail in the report, *The Timber Industries of West Virginia* (Bones and Glover 1977). The 1974 roundwood production in West Virginia from all sources and by products is:

	Million cubic feet	*Percent*
Sawlogs	72.2	66
Veneer logs	.5	[a]
Pulpwood	18.2	17
Cooperage logs	.5	[a]
Posts	2.1	2
Mine timbers	6.7	6
Other industrial	6.5	6
Fuelwood	3.0	3
Total	109.7	100

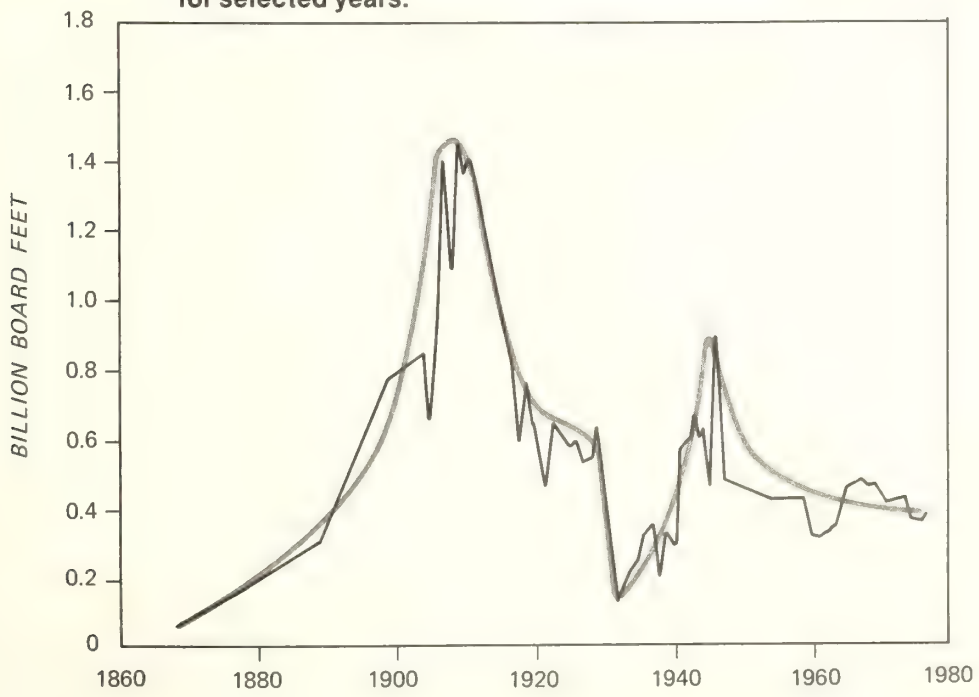
[a] Less than 0.5 percent.

Lumber and sawlog production declined

Historically, lumber production in West Virginia has fluctuated widely (Fig. 8). The earliest records (Steer 1948) show that production was 76 million board feet in 1869. Forty years later in 1909, lumber production reached a record high of nearly 1.5 billion board feet. The 537 million board feet of softwood production represented 38 percent of the total. By 1932, production had dropped to 135 million board feet, but World War II spurned production to 891 million board feet in 1946. Since the war, production has dropped to between 350 and 450 million board feet of lumber annually. Lumber production was 381 million board feet in 1974; 5 percent of the total was from softwoods.

The number of active sawmills in West Virginia and sawlog production and receipts have all declined in the past decade. There were 505 sawmills in 1965 that received 485 million board feet of sawlogs. In 1974, 365 sawmills received 447 million board feet of sawlogs. Sawlog production declined from 491 million board feet in 1965 to 464 million in 1974.

Figure 8.—Lumber production in West Virginia for selected years.



Even though the trends are down, unit productivity of West Virginia sawmills has been increasing. Average sawlog receipts per sawmill rose from about 950 thousand board feet in 1965 to 1.2 million board feet in 1974. The decrease in sawlog production and receipts was not uniform throughout the State. In fact, sawlog production in the Northwestern Unit rose 26 percent and receipts rose 17 percent between 1965 and 1974. Sawlog production and receipts declined more in the Southern Unit (the State's largest producing region) than in the Northeastern Unit.

Round pulpwood production down; residue chip production up

Pulpwood from roundwood (213.6 thousand cords) made up nearly 52 percent of the total pulpwood production in 1974. In 1960, when roundwood made up 100 percent of the harvest, 246 thousand cords were produced. So, although total pulpwood production rose by two-thirds to 412 thousand cords between 1960 and 1974, the roundwood harvest for pulpwood declined more than 13 percent. During the same period the softwood portion of the pulpwood harvest declined from more than one-third of the total in 1960 to less than one-fourth in 1974.

The use of chipped manufacturing residues has grown dramatically in the past decade. The 92 thousand cord equivalents recovered in 1965 represented 22 percent of the production total. In 1974, the 199 thousand cords that were recovered represented 48 percent of the total. As chipped-residue recovery increased over the years, the roundwood harvest for pulpwood decreased.

Total-tree harvesting systems are being employed in many of the hardwood areas of the Appalachian Region. With the cost of skilled labor and raw material (wood) going up, total-tree harvesters are an attractive alternative to conventional harvesting equipment. Three harvesters were operating in West Virginia in 1974. The 7.3 thousand cord-equivalents of chips that they produced represented about 3 percent of the total pulpwood harvest.

Thirty-eight percent of the pulpwood that was harvested from softwood species in 1974 came from three counties: Hampshire (5.6 thousand cords), Morgan (7.0 thousand cords), and Wirt (6.7 thousand cords). Greenbrier County was responsible for nearly one-fourth of the total harvest (53.1 thousand cords).

No pulpmills were located in West Virginia in 1974, so the total production was shipped to other states. Nine pulpmills in four states received pulpwood from West Virginia during the year. Most of the pulpmills produce bleached Kraft pulp.

Most other products come from hardwoods

Veneer and cooperage logs and bolts, posts, mine timbers, fuelwood, and miscellaneous products (total of 19.3 million cubic feet) accounted for 18 percent of the timber products output from roundwood in 1974. These products (30.1 million cubic feet) made up 28 percent of the roundwood output in 1960.

The 1974 outputs of roundwood volume for these other products—in cubic feet and percent—and percent from hardwood species are:

	Million cubic feet	*Percent*	*Percent hardwood*
Veneer logs	0.5	3	100
Cooperage logs	.5	3	100
Posts	2.1	10	91
Mine timbers	6.7	35	92
Fuelwood	3.0	15	95
Miscellaneous	6.5	34	42
Total	19.3	100	76

Veneer and cooperage log production has been decreasing; raw material for these products comes from high-quality, old-growth stands. Cooperage log demand has declined because white oak whisky barrel demand is down. Species preferences for veneer logs have become less pronounced recently as industry has developed ways of using a greater variety of species. In 1963, yellow-poplar accounted for 69 percent of the total veneer log harvest in West Virginia. In 1974, although it was still the most favored species, yellow-poplar accounted for 35 percent of the harvest.

Round and split mine timber production is directly related to the volume of coal that is produced in underground coal mines. Since coal production was less in 1974 than in 1960, production of mine timbers decreased.

Softwood fence rails made up a large portion of the miscellaneous products production in 1974; therefore the percentage of hardwoods was lower

in the miscellaneous category (42 percent) than in any of the other product categories

TIMBER SUPPLY OUTLOOK

The substantial increase in the area of commercial forest land since 1949, a 90 percent volume increase in the growing stock inventory, and the fact that timber removals in 1974 were only 35 percent of annual net growth are all positive signs and indicate that opportunities for forest industry expansion exist within the State. A comparison of unit and species statistics, however, show that these favorable indicators are not evenly distributed between geographic units and species. These imbalances will be discussed in coming portions of this section.

Thirty years from now

History provides valuable insights for predicting future trends. Since we have 25 years of observations about past inventory, growth, and removals levels for West Virginia, one approach to predicting future levels is to assume that the current inventory and growth trends will remain constant. Since removals in the past decade have been atypical, an accelerated rate was assumed. Other underlying assumptions include: (1) total area of commercial forest land will increase approximately 300,000 acres in each decade for the next 30 years; (2) average annual net growth rates for 1959 through 1974 will continue for the next 30 years; (3) and there will be no major increase in the level of forest management or timber utilization during the next 30 years.

Predictions, based on these assumptions, of growing-stock growth, removals, and inventory levels for softwoods are considerably different from those for hardwoods. The hardwood growing-stock inventory will increase from less than 13 billion cubic feet in 1975 to about 23 billion cubic feet in 2005, an 85 percent change. The softwood inventory, however, will increase 210 percent, from less than a billion cubic feet to 3.1 billion cubic feet. Higher growth rates and lower removal rates both contribute to the inventory gain for softwoods. The projected average annual growth rate of 3.9 percent for softwoods is 20 percent higher than that of hardwoods. Current annual removals equal 18 percent of growth for softwoods, compared to 37 percent for hardwoods.

The overall assessment shown in Figure 9 looks bright. Average volume of growing stock on commercial forest land is expected to increase from the present 1,177 cubic feet per acre to nearly 2,000 cubic feet per acre in 2005, even though the forest base is expected to increase by 900,000 acres with the inclusion of low-volume regenerating stands that are currently classified as pasturelands. As in so many cases, however, the aggregate projection tends to mask underlying problems.

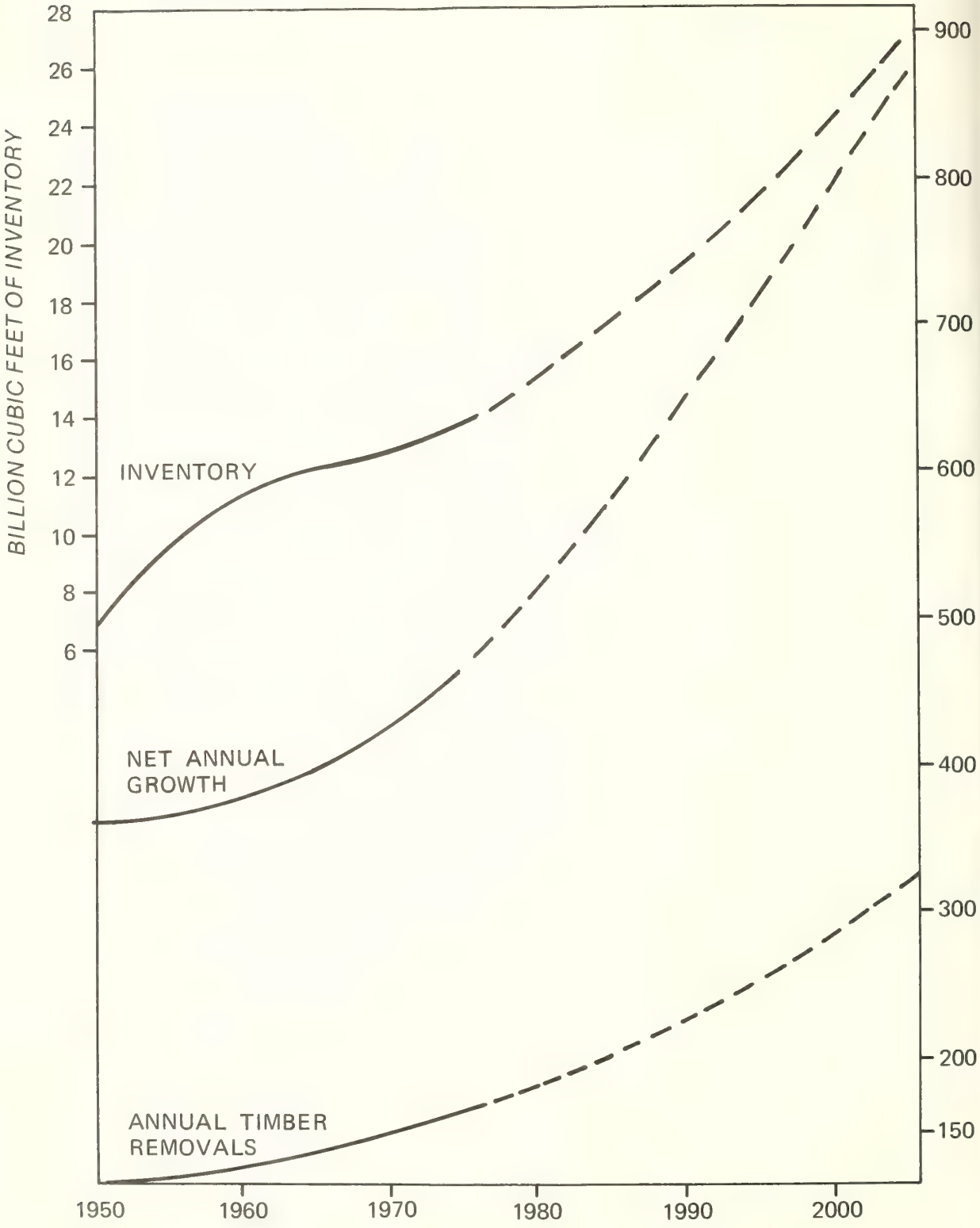
Since more than two-thirds of the industrial roundwood output in 1974 was used for such products as lumber, cooperage, and veneer, high-quality, large-diameter hardwood trees were in great demand. Sawtimber removals actually exceeded growth for sugar maple, beech, and hickory. Overcutting of these species was offset by growth of the select white and red oaks, yellow-poplar, and red maple. Since much of the sawtimber volume of yellow-poplar and the oaks is found in young trees less than 18 inches in diameter, high-quality logs are scarce.

Annual growth per acre will increase from 41 cubic feet per acre at present to about 70 cubic feet per acre in 2005 unless there is an increase in the level of timber management. The growth rate for these sites, even at the 2005 level, is much below their theoretical potential. About 83 percent of the commercial forest land in West Virginia is theoretically capable of producing more than 50 cubic feet per year, and 42 percent is capable of growing 85 cubic feet or more per acre per year.

Why is the per-acre growth so far below its potential? The answer relates to the type of trees that are occupying the growing space. This is particularly true for the hardwood stands that make up most of the commercial forest area. At times in the past, the best quality timber was removed for high-value products. As a result, many of the hardwood stands contain large numbers of poor-quality trees. Nearly a quarter of all the hardwood trees at present are either highly defective or have poor form.

By examining stocking levels by stand component, it is possible to determine the role of non-growing-stock trees in reducing growth. When all live trees are considered, 25 percent of the commercial forest land is overstocked. But, for growing-stock trees only, this percentage drops to 2 percent. By definition, overstocked means that

Figure 9.—Projection of inventory, growth, and removals in West Virginia to 2005.



there are too many stems per acre to permit maximum growth. Therefore, if the non-growing-stock component could be reduced in these timber stands, they could be made to produce at a higher rate.

Harvesting the growth

Statewide, the main source of the timber harvest has shifted during the past two decades from public to private lands and from farmer and mostly small individual ownerships to forest industry and large corporate ownerships. During the 1950's about 14 percent of the timber harvest came from public timberlands and only 1 percent came from forest industry lands. During the 1960's less than 10 percent of the growing-stock harvest came from public lands and about 16 percent of the sawtimber harvest came from forest industry lands. Ownership of the private lands has been shifting over the past 20 years from farmers to individuals and from corporate to forest industry ownership. Many of the family farms have been subdivided and purchased by individuals with diverse occupations. Many of the new owners reside in the metropolitan centers of neighboring states. These individuals now control 5 million acres of the commercial forest lands, or 42 percent of the total.

Harvesting levels as a percentage of growth differ among the State's three geographic regions. Although the annual growth is greatest in the Northesastern Unit, only 33 percent of the 200 million cubic feet of growing-stock growth and 38 percent of the 374 million board feet of sawtimber growth is being harvested. By contrast, in the Southern Unit, current removals equal 57 percent of the growing-stock growth (135 million cubic feet) and 106 percent of the sawtimber growth (207 million board feet). Many factors affect the amount of timber harvested during any one year, but ultimately the harvest-nonharvest decision rests with the forest- land owner. The Northeastern Unit has the highest percentage of public land ownership in the State yet only a third of the growth is being harvested. The Southern Unit has the highest percentage of forest industry and other large corporate ownership and the highest harvest-to-growth ratio.

The private forest-land owner's willingness to harvest timber from his land was assessed during the resurvey (Birch 1977). Fifty-three percent of the individual forest-land owners (who control 26 percent of the 4.8 million acres of commercial forest land) said that they never intended to harvest timber from their land. Conversely, only 7 percent of the individual landowners (who control 17 percent of the commercial forest land) indicated a positive inclination for harvesting timber.

A summary of the current distribution of the State's commercial forest land by classes of forest-land owners, acreage of commercial forest owned, and the acreage owned by those who intend to harvest timber are:

ACREAGE OF COMMERCIAL FOREST LAND
(Million acres)

Class of owner	*Total*	*Plan to harvest*
Public	1.1	[a]
Farmer	1.9	.5
Forest industry	.9	.8
Corporate	1.8	1.3
Individual	4.8	.8
Other	1.0	.3
Total	11.5	3.7

[a] Previously restricted; harvesting currently resumed.

If current attitudes persist, only a third (3.7 million acres) of the commercial forest land in West Virginia will be available for timber harvesting. The major source of timber will be forest industry and other corporate forest lands. Certainly any future expansion of local timber industries will depend upon industry's ability to convince individual landowners to manage and utilize the timber that they control.

Public land management strategies have also been altered during the last decade in response to the public's desire for a redirection of land-use priorities. Although timber management will always be a high priority resource use for public commercial timberlands, West Virginia residents are also deeply concerned with protecting the recreation, watershed, and visual values on public lands. As time passes, tradeoffs are certain to occur; for example, the very access that is so essential for intensive timber management will detract for wilderness-type, dispersed recreation experiences.

A federal court order in 1973 curtailed timber sales over a 4-year period on national forest lands in West Virginia. Based upon a strict interpreta-

tion of the Forest Service Organic Act of 1897, the court order ruled that only dead, matured, and large trees could be sold, that the timber must be marked and designated before cutting, and that trees must be cut and removed under Federal supervision. Forest managers believed that by imposing these restrictions the court made it impossible to use harvesting as a means toward good silviculture. The controversy was settled when the National Forest Management Act of 1976 was signed into law by President Ford on October 22, 1976. In addition to correcting the wording about timber sales in the 1897 legislation, it provided broad policy direction for the entire National Forest System including the national forests of West Virginia.

Inventory versus timber supply

Timber supply can be defined as the net utilizable roundwood volume removed from the forest, and may include wood from live, sound (growing stock) trees or from dead and cull trees. Not all of the tree volume included in the timber inventory is harvested and converted into timber products, and conversely, not all of the timber harvested for products is included in the inventory. Timber recovery depends mostly on such variables as the state of the economy, consumer preferences, the location and accessibility of timber, the condition of the timber stand, and the products that will be made from the timber. The timber supply may differ for different product alternatives and may be greater or less than the growing-stock inventory.

From utilization studies, we were able to determine current utilization levels for the major timber products. For example, we found that when sawlogs are harvested from a typical hardwood stand, approximately 70 percent of the total growing-stock removals (inventory volume) is recovered for lumber products. The remaining 30 percent is left at the harvest site as logging residue. This residue consists mostly of growing-stock trees that were destroyed during harvesting or tree sections from which the entire merchantable bole was not recovered. In addition to the growing-stock volume that is recovered for products, a volume of sawlogs equivalent to 21 percent of the total harvest (supply volume) was recovered from such non-growing-stock sources as tree tops and dead and cull trees. We also found that multiproduct harvesting in West Virginia hardwoods can increase product yield by 24 percent over single-product sawlog harvesting; a 3 percent increase in product recovery from growing stock (inventory) and 21 percent increase from non-growing-stock sources.

Conventional logging practices are giving way to new and innovative practices that promise to increase the timber product recovery significantly; especially in the hardwood stands now being harvested for pulpwood and other fiber products. A local researcher [1] reports that per-acre wood fiber yields might be increased 20 to 60 percent by total-tree harvesting in West Virginia. Total-tree harvesting means that the above-ground portions (excluding the stump) of all trees 2 inches dbh and larger are chipped, including the bark. In 1974, the three total-tree harvesters that operated in West Virginia produced about 7,300 cord-equivalents of pulp chips.

OTHER NATURAL RESOURCES

The land—its use and management

Since the land area is fixed and population density is increasing in West Virginia, the available land must be managed more intensively. Only by establishing land-use priorities based on public demand can the resources be equitably allocated.

Often user groups find themselves competing for exclusive use of the same land; and when the uses are not compatible, conflicts result. Resource managers at all levels should be active participants in land-use planning at an early stage and where possible, should resolve local conflicts before public opinion has polarized and emotion has affected the decision-making process.

Probably the most critical variable in the natural resource allocation equation is the human factor. Land administrators or owners are responsible for making the final decisions on resource uses. While public land managers have the difficult task of correctly assessing the ever-changing moods of the people, individual private landowners often lack the expertise and technical knowledge needed to make sound land management decisions. But owner attitudes, along with such factors as location and the physical attributes of the

[1] Personal correspondence from B. B. Brenneman, Research Forester, Westvaco, Rupert, West Virginia.

land, will determine future use levels of renewable resources.

Public lands. About 1.3 million acres of land in West Virginia are administered by public agencies. Nearly a million acres are in national forests, mostly located in the Appalachian Highlands. The location and extent of the Forest Service land will probably cause it to dominate future resource-use decisions in the region, but at the same time restrict the uses that the public is willing to accept for the land. Future management priorities will probably be based more on political considerations than economic ones.

Water. The headwaters of both the Ohio and Potomac River systems are located in the national forests, and these lands are an important source of pure surface water. One high-priority objective of national forest managers is to maintain and enhance water quality and to regulate flow. Resource uses that jeopardize water quality or upset flow patterns are to be avoided.

Over 70 percent of the cold water fish habitat in West Virginia is inside the national forest boundaries (U.S. Forest Service 1975a). In addition, some 351 miles of warm water streams and nine fishing impoundments (totaling 274 acres) are located in national forests. Trout is a highly regarded game fish. Fishermen spent 894,000 man-days (43 percent of their total angling time) fishing for trout in 1970. State harvest records (West Virginia Dept. Natural Resources 1973) show that about half of the trout caught each year are taken within the national forest boundaries. Cold water angling on the Monongahela National Forest alone is projected to grow from 195,800 visitor days in 1973 to 250,000 visitor days in 1985.

Outdoor recreation. Over 10 million people live within 150 miles of the public lands that are concentrated in the Appalachian Highlands. Public lands are the primary source of dispersed and primitive-type outdoor recreation available to this growing population. For this reason, some of this land has been formally classed as national recreation or wilderness areas and other land may later be reclassified to these uses. Of the 1.2 million visitor days spent on national forest lands in 1973, over half were spent pursuing such dispersed activities as camping, hunting, hiking, rock climbing, and bird watching (U.S. Forest Service 1975a). Forest Service managers estimate that dispersed outdoor recreation will increase to more than 1 million visitor days annually by 1985 and 2.5 million visitor days by the year 2000.

Most public lands are forested with maturing timber stands that are well suited to black bear, snowshoe rabbits, turkeys, and crown-nesting birds. Bears and turkeys require more isolation to thrive than the so called "edge species" and are compatible with other dispersed recreation use. Over 80 percent of the bear and snowshoe rabbit harvest came from public lands in 1974.

Private land. The 14.1 million acres of privately owned land comprises about 92 percent of the total land area. These private lands contain 10.3 million acres of commercial forest land which currently supports about 11.3 billion cubic feet of growing-stock volume, including 22.9 billion board feet of sawtimber. The size of private holdings varies greatly as do owner attitudes toward using and managing their land. The following tabulation shows the distribution of West Virginia's 207,500 private landowners and the commercial forest land acreage they own by classes of ownership (in percent):

Class	*Owners*	*Acreage*
Corporate	1	17
Forest industry	[a]	8
Farmer	21	19
Individual	69	46
Other	9	10
Total	100	100

[a] Less than 0.5 percent.

The 143,000 individual forest-land owners control 42 percent of the commercial forest land, but since the control of these lands is so highly diffused, uniform management will be difficult. Corporate owners (including forest industry) however, are better organized for efficient timber management; they represent 1 percent of the total landowners and control 25 percent of the commercial forest land.

When timber harvesting was restricted on public lands, local timber-product manufacturers shifted to private lands for their raw material. The net growth from the 879,700 acres of timberlands owned by forest industry is already being harvested. Therefore, any increase in the level of harvesting will result in depleting the overall timber supply on these lands. Non-forest-industry corpora-

tions own about 1.8 million acres of commercial forest land. Even though timber is not their primary interest, 11 percent of these corporations (which control 76 percent of the industrial commercial forest acreage) indicated in a recent survey (Birch 1977) that they intend to harvest timber in the next decade.

Without the support of the 143,400 individual private landowners (who control 4.8 million acres of West Virginia's commercial forest land) future timber-related industrial expansion of any significance will be impossible. Currently, wide support for timber harvesting is lacking. Only 7 percent of the individual owners who control 17 percent of the total acreage said they plan to harvest timber during the next decade. Conversely, 53 percent of the owners who control 26 percent of the acreage said that they will never harvest timber. Therefore, not only a neutral attitude, but a negative attitude toward harvesting must be overcome before this ownership group will consider harvesting timber.

Outdoor recreation. A major problem in meeting the demands for small game hunting and warm-water angling is providing access to the privately owned lands. When asked, less than half of the individual private landowners indicated that they would permit small game hunting or fishing. The most likely approach to ensure that these wildlife populations are maintained and available to hunters and anglers may be to provide economic incentives for the landowners.

Mineral extraction. Strip mining was carried out for iron ore between 1822 and 1866. Natural revegetation has now completely blanketed the spoil areas and mature yellow-poplar and oaks predominate.

Strip mining for coal in West Virginia began around 1917 but substantial activity did not develop until 1940. By 1950 about 70,000 acres of coal had been stripped and about 2,000 acres were being added annually (Core 1966). The unsightly spoils are unassorted, where fine rock particles were mixed with huge rock fragments and slabs. Usually the top soil was buried. Natural vegetation on these areas proceeded very slowly. Since 1945, however, regrading and planting and seeding have been required by law in West Virginia. A recent Stanford Research Institute study (W. Va. Office of Federal-State Relations 1975) estimated that approximately 247,824 acres of land have been disturbed by surface coal mining, and local mining officials estimate that more than 15,000 acres of surface coal is being stripped annually.

Although the primary purpose of revegetating these areas is to stabilize them and protect them from erosion, good timber and wildlife production can be realized. On favorable sites, tree plantations managed for timber production can produce poletimber-size trees in 25 years and small

Rehabilitation is an essential final step in any strip mining venture. The unsightly spoils are highly visible during stripping (left photo). If the revegetation and stabilization programs are successful, old spoils can be both visually pleasing and productive (right photo).

sawtimber in 35 years. Researchers (Davis and Davidson 1968) report that pines and other conifers do particularly well on acid spoils. Areas developed for wildlife production include small water impoundments and the cultivation of food strips, with plantings or grasses, legumes, and shrubs. Coal-haul roads constructed during mining operations open up large areas that were previously inaccessible to hunters. Although sediment and chemical pollutants associated with strip mining are often harmful to the fish and other aquatic life in streams draining mined areas, there are situations where the water can be successfully impounded and restocked with resistant warm water fish species (Baumgardner and Steiner 1974).

Water supply is adequate; quality is a continuing problem

Precipitation for most of West Virginia is adequate and fairly well distributed over the State throughout the year. Average annual precipitation is about 43 inches, approximately 8 percent falling as snow. The high mountain areas of the Appalachian Plateau get as much as 65 to 70 inches of precipitation annually, while some valleys immediately east of the Allegheny Front receive as little as 31 inches.

In the typical forest, approximately 6 inches of the 43-inch rainfall is intercepted by vegetation before it reaches the soil and is either evaporated or transpired back into the atmosphere. The remaining precipitation soaks through the litter into the underlying soil. About 18 inches of this soil water is absorbed by tree roots and evaporated through the leaves.

The remaining 19 inches of the annual precipitation, collected on the approximately 24,080 square miles of drainage area in the State, is discharged through 32 major stream systems. [2] These streams are a major source of domestic water, supply water for industrial complexes, and provide hundreds of miles of cheap transportation and hydroelectric power for West Virginia residents and industry.

Water use has been substantial in recent years—over 6 million gallons per day. While surface water withdrawals account for over 95 percent of the total use, ground water is the most important source of public water supply systems. The alluvial deposits of the Ohio Valley provide West Virginia's most productive aquifer. Smaller supplies of underground water are found in the Kanawha and Monongahela Valley alluviums. A number of public water systems, primarily in the southern coal fields, use mine waters as their source of supply.

The major limestone deposits of the eastern panhandle and the counties that form the southeast boundary with Virginia have abundant groundwater springs. There are more than 200 major springs in this area that yield at least 100 gallons or more of water per minute. Big Springs, in Grant County, has yielded as much as 269,000 gallons per minute.

The quantity of water available for use is of little concern since the supply is many times greater than the present use. This does not mean that good water management should not be practiced, however, since poor management leads to water quality deterioration and uneven runoff when soil is exposed. Even under normal conditions, average streamflow is much greater in the winter and early spring than in the summer and fall. Massive earth disturbances in a watershed can upset the natural regime of streamflow, producing interrupted flow in the summer and floods that cause accelerated erosion and stream sedimentation in the winter (Kochenderfer and Patric 1970).

Water quantity and quality problems are often related. When streamflow is low, pollution levels are high, because less water is available to dilute the pollutants. A stream that is rated clean at normal levels may become an open sewer at low flow levels when it still carries the same volume of polluting material.

To combat today's water-related problems and to assure an adequate future supply, effective water management is necessary. This will require accelerated conservation and protection activities, continued pollution reduction, devising of better techniques for processing and reusing the available water, and development of an effective program for allocating the available water among competing uses.

Well-managed, productive forests protect, regulate, and improve the supplies of available water. Even when timber stands are harvested, sediment buildup in most forest streams is tolerable and only temporary (Lull 1971). Sediment levels in

[2] Personal correspondence from C. A. Troendle, Research Hydrologist, U.S. Forest Service, Parsons, W. Va.

eastern hardwood forests may increase from 0.02 ton per acre annually to 0.04 to 0.50 ton per acre during harvesting, but will return to preharvest levels within 2 years after logging if normal erosion control guidelines are followed. By contrast, erosion of from 1 to 5 tons per acre per year is recognized as tolerable for agricultural land (Patric 1977).

Outdoor recreation increasing in importance

The need for recreation is inherent in man and the list of his recreational pursuits is endless. A continuing chess game at coffee breaks, an afternoon of golfing or fishing, or a week of backpacking in a wilderness all are within the spectrum of activities that afford man an opportunity to "recreate" himself.

Because recreation activities are so diverse, many levels of government and private enterprise become involved in planning for them. The need for recreation in West Virginia and the acceptance of government involvement in it affects all 55 county governments, 226 municipalities, at least 12 state and numerous Federal agencies. The private sector fills in the gaps, especially in the field of tourism. The travel industry alone, including private enterprise, had direct sales within the State of about 540 million dollars in 1972 and provided direct employment for some 42,000 West Virginians (W. Va. Office of Federal-State Relations 1975).

Most recreation is either activity-based or resource-based. Activity-based recreation is characterized by high development costs, while resource-based recreation requires a minimum of development. Activity-based facilities such as playgrounds, tennis courts, and baseball diamonds require less acreage for development, while resource-based recreation requires large acreages and a natural setting. Resource-based recreation is directly related to the forest land base and its use.

Certain areas within West Virginia are remnants of the original undisturbed landscape, or have unique natural features or are of historic value. Not only do many of these areas furnish unique recreation experiences for the State's residents, but they are also of national significance. Heavy demands upon West Virginia resources for recreation also come from the more urban neighboring states. Consequently, many of the natural areas assume a regional significance.

Resource-based outdoor recreation experiences are especially treasured by urban residents (Courtesy of Wonderful West Virginia Magazine).

To determine the demand for such areas, one must first identify what resources are available and the motives or pressures for their utilization. Success in fulfilling the demand for resource-based recreation cannot be measured solely in terms of public use, since overuse of these areas often results in major management problems that require restriction on control of public access. Determining optimum levels of use will be a continuing problem for outdoor recreation managers.

Management of the resource-based recreation areas of West Virginia was until recently divided between several State and Federal agencies. On February 13, 1975, the Governor created by executive order a Heritage Trust Advisory Commission whose goal is to identify and protect those areas (natural, recreation, and historic) that have great intrinsic value and are in need of special consideration. The first phase of this program will be to inventory those natural, recreation, and historic sites that have statewide or national significance. After the cataloging is complete, the inventory will be compared to estimates of current and projected demand.

Most of the resource-based outdoor recreation in West Virginia is on public lands. Over a million acres are administered by Federal agencies and another one-quarter million acres by State agencies. Ninety-two percent of this land—1.3 million acres—is classed as natural environmental land and is located in national or state forests and parks. The national forests are managed under multiple-use and sustained-yield principles. Recreation resource values are identified and managed in harmony with other resource values. In a like manner, the West Virginia Division of Forestry manages the state forests for a variety of uses, the Division of Parks and Recreation administers a system of recreation parks for general recreation, and the Wildlife Division manages the wildlife resource areas for public hunting and fishing. The parks and wildlife areas were acquired specifically for recreation purposes and to ensure the preservation of natural environmental areas.

Federal and State agencies have also identified approximately 100,000 acres that are considered to have unique scenic, historic, or cultural value, or are primitive in nature. These areas must be preserved and protected in their natural state since they are considered of national importance. Some of these areas have been formally designated as Registered National Landmarks under Public Law 74-292 or classified as Wilderness Areas under Public Law 93-622. Currently West Virginia has two Wilderness Areas ; Otter Creek, 20,000 acres in size, and Dolly Sods, 10,250 acres in size. A third area in Webster and Pocahontas counties, the Cranberry Back Country (36,300 acres) is being considered for inclusion in the national wilderness system. The major national historic landmark in West Virginia is the Harpers Ferry National Park. Visitors come from all over the world to visit this place that is rich in Civil War history. The State has several major cultural and historic parks that preserve locations of importance to West Virginians. The Cass Scenic Railroad and Droop Mountain Battlefield State Park in Pocahontas County, the Carnifex Ferry Battlefield State Park in Nicholas County, and the Watters Smith Memorial State Park in Harrison County are important ties to the State's heritage.

Although studies conclude that the current outdoor recreation requirements of certain segments of the West Virginia population are not being met, overall the total recreation resource is adequate (W. Va. Office of Federal-State Relations 1975). Activity-based recreation, which is directly related to people, their density and interests, needs to be expanded in places where population density is increasing and in rural areas where few facilities currently exist. Many of the shortages in outdoor recreation facilities can be traced to poor distribution because of recent population shifts. In these cases, interim measures can be initiated. These might include making more efficient use of existing facilities by making them available at night or extending their present seasons of use. Another example would be the use of school facilities for adult recreation. Schools could be especially valuable for such uses as crafts programs for the handicapped or aged. Libraries, religious facilities, and other public buildings are often under-utilized, and in many cases, they are already equipped with ramps and handrails for the handicapped.

Recreation planners should encourage recreation development as an integral part of future public works projects and private developments within the State. River basin and highway development projects that are currently in the planning stages will provide excellent opportunities for incorporating such facilities as picnic

tables, boat ramps, beaches, and scenic observation points and information facilities.

State outdoor recreation planners estimate that out-of-state residents account for 35 percent of the total annual recreation use. These nonresidents come to escape the urban areas in which they live or are travelers enroute to other places. Although these tourists use accessible activity-based recreation facilities, they are mostly drawn by the rural setting and resource-based outdoor recreation areas.

West Virginia is fortunate to have more federally administered resource-based outdoor recreation land than any other state in the Northeast (W. Va. Office of Federal-State Relations 1975). As construction of the Federal highway system is completed, more outdoor recreationists from neighboring urban states will seek out these resource-rich recreation lands to "get away from it all".

Wildlife resource is varied

The climate, topography, and geology of an area influence the composition of the plant community, and the nature and abundance of the local vegetation, in turn, influence the kinds of wildlife that an area can support. West Virginia is unique among the eastern states. The State is the meeting ground for typically northern and southern flora and fauna and thus provides a wider variety of plant and animal life than most other states. The Allegheny Mountains which bisect the State are covered with the northern hardwood and spruce-fir forests that are characteristic of the forests further north. The eastern slopes of these mountains are predominatly oak-pine and the western slopes and lower elevations are dominated by the oak-hickory forests typical of the central hardwood region.

Past human influences. As man made his imprint on the landscape certain environmental changes occurred which radically affected the compositon of the wildlife population. Thus, as West Virginia was transformed from a wilderness to its present state there have been significant changes in the composition and abundance of the native wildlife. The bison, eastern cougar, river otter, elk, wolf, passenger pigeon, and sturgeon, once indigenous to West Virginia, have been extirpated (W. Va. Dep. Natural Resources 1974). Few of these native wildlife species were purposely exterminated by man. Most were victims of habitat destruction by land filling and clearing, siltation and pollution, wildfires and erosion, and other massive man-made environmental changes.

Most fish and wildlife are sensitive to environment change. As mature forests are cleared, natural watercourses changed, wetlands drained, and streamflows and temperatures altered the quantity and quality of the food, water, and cover for the native fish and wildlife are immediately affected. Some man-made changes may be beneficial to wildlife. Opening up the native vegetation as the State was settled, providing a good balance of mature forests, regenerating forests, and open spaces, increased the food supply and encouraged ever-increasing populations of such "edge" species as deer, grouse, and cottontail rabbits (U.S. Forest Service 1970). The deer population in West Virginia in the early 1900's was estimated at about 1,000 animals. The white-tailed deer harvested by gun alone in 1974 numbered nearly 24,000. In addition, over 2,000 deer were harvested during bow-hunting season and 4,000 were known to have been killed illegally or accidently.

The populations of certain "interior species", such as gray squirrels, turkeys, and snowshoe hares, have been reduced over the years as the mature timber stands of the State were converted. A striking example of population reduction that resulted from habitat reduction is that of the snowshoe hare, whose range is limited to the spruce-fir type about 3,000 feet elevation in the Allegheny Mountains. Originally this forest type occupied 469,000 acres of West Virginia high country (Core 1966). Over the years its extent has been drastically reduced, first by clearcutting and later by repeated burning, until today it covers less than 60,000 acres.

Wildlife resource requirements. The maintenance and perpetuation of the wildlife resource is important to most West Virginians. Many rural residents consider hunting and fishing an essential part of the agricultural harvest and the major form of recreation available to them. Urban dwellers value the closeness of good hunting and fishing. They spend a sizeable portion of their discretionary income each year on hunting and fishing licenses and equipment.

The following statistics present the past and expected future growth in number of resident and nonresident licensed hunters and fishermen in West Virginia:

Year	Hunters			Fishermen		
	Resident	Nonresident	Total	Resident	Nonresident	Total
	(Thousands of licensees)					
1960	211.6	7.9	219.5	148.9	9.0	157.9
1965	224.1	13.0	237.1	187.8	22.6	210.4
1970	234.2	22.8	257.0	219.2	33.4	252.6
1973	232.6	25.9	258.5	222.5	23.3	245.8
1980[a]	239.0	30.0	269.0	230.0	34.0	264.0
1990[a]	244.0	36.0	280.0	241.0	40.0	281.0
2000[a]	252.0	44.0	296.0	256.0	48.0	304.0

[a] Estimates based on past trends.
Source: 1960-1973 Statistics; West Virginia Div. of Wildlife Resources.

Demand for wildlife resources has been growing over the years. Resident hunting and fishing license sales increased 11 percent and 47 percent respectively from 1960 to 1970. More important, however, is the increase in nonresident license sales. The 7,900 hunting licenses that were purchased by nonresidents in 1960 represented less than 4 percent of total sales. In 1973, the 25,900 nonresident hunting licenses purchased represented more than 10 percent of total sales. If these trends continue, an estimated 296,000 hunting licenses and 304,000 fishing licenses will be purchased by the year 2000. About 15 percent of the total will be purchased by nonresidents.

A hunting use survey in 1970 (Riffe 1971) indicated the type of forest game animals that hunters preferred to hunt. Most popular among the respondents were squirrels, followed by deer, ruffed grouse, wild turkey, raccoon, bear, woodcock, and snowshoe hare. In addition, cottontail rabbits are a highly regarded game animal on agricultural land. Trout is the most popular forest-game fish.

These preferences are supported by 1970 statistics (West Virginia Dept. Natural Resources, 1974) that show the number of licensed hunters that hunted these game species and the number of days they spent hunting them.

Species	Hunters	Days hunted
White-tailed deer	145,935	630,620
Wild turkey[a]	61,413	215,276
Ruffed grouse	76,000	445,000
Bobwhite quail	19,180	91,275
Mourning dove	5,443	33,868
Woodcock	15,000	26,000
Cottontail rabbit	128,000	900,000
Squirrels	178,624	1,247,600
Raccoon	17,000	162,000
Foxes	12,568	62,504

[a] Includes two season; fall 1970 and spring 1971.

Nearly 179,000 licensed hunters spent 1.2 million hunter-days hunting for squirrels in West Virginia. Based on number of hunters, white-tailed deer and cottontail rabbit ranked second and third. Based on number of hunter-days, cottontail rabbit and white-tailed deer ranked second and third. Nearly 894,000 angler-days were devoted to trout fishing in 1970. This represented 15.7 percent of the total licensed fishing effort statewide.

The West Virginia Wildlife Division has made projections of the total number of days that will be expended by hunters and anglers in the pursuit of game animals and fish, based on previous activity. Statewide projected demand in number of hunter and angler days of recreation is:

	1980	*1985*	*1990*
Hunter-days	4,937,000	5,480,000	6,033,000
Angler-days	2,616,000	2,819,000	3,023,000

Wildlife habitat management. These sportsmen's preferences along with the acreage and general condition of the game habitat are important to consider when planning game management programs. Statistics generated during the State's 1975 timber survey provide insight into the character of the existing vegetation in the various cover types and their relative productivity, and when compared to previous surveys reveal important vegetational changes.

Cover type	Character of vegetations			Relative productivity for wildlife[a]
	Mature timber	Immature timber	Open	
	(Million acres)			
Oak-hickory	1.9	2.7	0.1	H
Mixed Appalachian hardwoods	1.2	1.6	—	H
Northern hardwoods	1.6	1.0	[b]	M
White and red pine	[b]	.1	—	L
Virginia pine	.2	.3	—	M
Spruce-fir	[b]	[b]	[b]	L
Elm-ash-cottonwood	.2	.6	—	M
Pasture	—	—	1.4	M
Cropland	—	—	.5	L
Total	5.1	6.3	2.0	

[a] L = Low; M = Medium; and H = High. Ratings were adapted from U.S. Dep. Agric. Forest Service General Technical Report NE-12.

[b] Fewer than 50,000 acres.

With a knowledge of specific wildlife habitat requirements and of the character of the vegetation available at any point in time, crude estimates can be made of the prime habitat acreage that is available. The following compilation gives the current acreages of prime habitat that are available to some of the important West Virginia game species.

Species	Prime habitat[a]
Big game:	(Million acres)
White-tailed deer	8.0
Black bear	2.5
Wild turkey	4.0
Upland game birds:	
Ruffed grouse	7.4
Bobwhite quail	5.8
Ring-necked pheasant	.1
Mourning dove	1.4
Woodcock	.8
Upland game mammals:	
Cottontail rabbit	6.6
Snowshoe hare	.1
Squirrel	7.2

[a] Indicates acreage of cover present that should furnish adequate habitat based on known specie preferences. Does not consider such factors as remoteness or human population density.

Large acreages of prime habitat are currently available to several game animals. This is only partially the result of current land use. Superior environmental adaptability and high mobility also affect the prime habitat acreage. The habitat available to the Bobwhite quail, for example, is limited because their habitat is specific (early plant communities with abundant seed-producing weeds). White-tailed deer, on the other hand, are adapted to many types of vegetative cover as long as the cover is varied. Deer also range over large territories to satisfy their basic needs.

Recent research (Gill, Thomas, et al. 1975) into the relative carrying capacity of seven forest cover types in West Virginia, based on repeated observations of game occurrence, has provided forest land managers with a tool to assist them in developing those timber and wildlife management strategies that are most beneficial for both resources. A comparison of these numerically rated forest type/game relationships allows the systematic consideration of management alternatives and measures the relative magnitude of the trade-offs that might result from management prescriptions.

Management implications of land-use trends. Agriculture, as practiced on the family farm, has been declining in the last quarter century, and as a result, the area in forest cover has been increasing. Statewide, the commercial forest land area has in-

creased from 64 percent of the total land area in 1949 to 74 percent in 1975. Although the State's Northwestern Unit experienced the greatest increase in commercial forest area (up 43 percent), it is still the least forested portion of the State (71 percent). The Southern Unit, which has the greatest percentage of forest cover (78 percent), had the smallest percentage increase (up 1 percent). The Northeastern Unit, which is 74 percent forested, experienced a 17 percent increase.

Abandoned farms and their pastureland are reverting to forest. As grasslands disappear, so do the grassland-dependent species of animal life. They are replaced by animals of the thicket; and these in turn will be replaced by forest-dwelling animals. Over much of the State, selectively harvested forests are closing as young growth fills in the openings around the less desirable and highly defective residual trees. The value of these stands for white-tailed deer is declining, but is improving for the wild turkey and the gray squirrel. Thus, as the plant communities change over time, so do the animals; for each is closely tied to the other.

Habitat requirements and some of the management strategies that may be initiated to improve the local habitat for some of West Virginia's important game animals are listed:

Game species	Habitat requirements and special problems	Positive management strategies
Big Game:		
White-tailed deer	Flourishes in managed young-growth mixed hardwoods in various stages of development interspersed with active farms. Winter food supply, urban development, uncontrolled dogs, and hunter access affect population level.	Control deer population distribution by special hunts. Encourage hunter access to private lands.
Black bear	Requires extensive roadless areas with little human activity.	Administratively reserve existing prime habitat on public lands. Maintain current population levels through controlled harvests.
Wild turkey	Flourishes in mature oak-hickory and northern hardwood stands. Short-rotation timber harvesting and conversion to softwood types is detrimental to increasing population.	Long-rotation timber practices that favor retention of mast-producing trees enhance food supply. Controlled hunts in high population counties maintain good bird distribution.
Upland game birds:		
Ruffed grouse (White 1968)	Prefers early successional plant communities created by timber harvesting, farmland abandonment, restored surface mining, or burning.	Short-rotation timber management. Provide for a variety of human disturbances that will ensure sufficient habitat.
Bobwhite quail	Prefers early successional plant communities created by periodic disturbances.	Provide required habitat by prescribed burning, timber harvest, moderate grazing, raising grain crops.
Mourning dove (Goudy 1975)	Prefers extensive areas of grain crops.	Reverse trend of converting cropland to grassland in West Virginia.

CONTINUED

Continued

Game species	Habitat requirements and special problems	Positive management strategies
Woodcock	Prefers moist areas with brush or low woody vegetation. Dams, stream channelization, intensive agriculture, and pesticides are detrimental.	Encourage greater hunting pressure. Provide early successional plant communities.
Upland game mammals:		
Cottontail rabbits	Prefers early brush vegetative stages dominated by herbaceous vegetation and vines. Herbicide use and progression into sapling state of succession are detrimental.	Short-rotation, even-age harvesting systems, and prescribed burning.
Snowshoe hare	Prefers dense, high-elevation stands of conifer types (above 3,000 feet) interspersed with thickets of shrubs. Large acreages have been converted to northern hardwood types.	Management practices that promote restoration of hardwood stands to conifers.
Squirrels	Prefers mature mast-bearing stands of oak-hickory type. Short rotations and even-aged management are detrimental to nut production and shelter.	All-age management practices that favor mast-producing trees and retain den trees.

Fish resource management

The natural diversity of West Virginia streams and rivers originally provided habitat for a wide range of fish species. As settlement proceeded and the mineral and timber resources were exploited, uncontrolled wildfires occurred and the distribution of the original fish resources was altered. Also, large power and flood control dams were constructed that created large man-made impoundments on some of the major rivers. Current management programs are centered in three main areas: cold water streams, warm water rivers and waterways, and reservoirs and small impoundments.

Cold-water streams. Present cold-water management efforts are focused on the protection and perpetuation of three trout species. Brook trout, a West Virginia native, was originally found in the headwaters of most of the State's rivers. Rainbow and brown trout were introduced. Hatchery records (W. Va. Dept. Natural Resources 1973) show that rainbow trout were introduced into West Virginia streams from the Federal hatchery at White Sulphur Springs in 1903 and that brown trout were introduced in the 1930's.

Fishery managers estimate that there are about 7,580 miles of fish-supporting habitat along the 8,000 streams that drain water from within the State's boundaries (W. Va. Dept. of Natural Resources 1973). About 710 miles of this is cold water fish habitat and 564 miles is known to be supporting populations of native brook trout. In addition, hatchery-raised rainbow and brown trout are living and reproducing along about 26 miles and 10.5 miles of cold water streams respectively. Fishery biologists say that the existing cold water fish habitat could be extended by 144 miles if current pollution levels could be abated.

Problems that effect trout populations can be either physical or chemical. Vegetation removal and stream disturbances can result in widely fluctuating stream-flow, high water temperatures, and sedimentation. Surface runoff carries soil particles and nutrients into the streams. The fine particles produce turbidity, which enhances the absorption of solar energy by the water, raises its temperature, and depletes its oxygen. These changes reduce the trout population. As the soil particles settle, they form a sediment over the stream bottom that chokes off necessary bottom-dwelling organisms and smothers the year's pro-

duction of trout eggs. Chemical problems are more subtle. Acid mine drainage causes the most serious chemical problems in West Virginia streams, but high total heavy-metal levels have also been know to hamper trout reproduction and diminish oxygen and natural food supplies. The full effects of acid rainfall from industry centers in neighboring states have yet to be evaluated.

West Virginia's trout stocking program is the State's most important ongoing recreation fishing program and accounted for about 40 percent of the total expenditures of fish management funds in 1971. Based on total poundage, trout production from the four State and three Federal hatcheries within the State has climbed 126 percent in the last decade, from 208,000 pounds in 1960 to 470,000 pounds in 1971. Seventy percent of the 1971 poundage was rainbow trout. Trout were released along 887 miles of stream and in 30 impoundments during the year.

Warm-water rivers and waterways. Although sunfishes are the most numerous and widely distributed warm-water game fish, warm-water anglers prefer to fish for small mouth and largemouth bass, walleyes, and catfish (W. Va. Dep. Natural Resources 1973). In 1970, anglers spent 1.6 million angler-days fishing for bass and harvested 2.9 million legal bass. Smallmouth bass especially are recognized as a prized trophy fish and an excellent food fish. Channel catfish, which may attain 15 pounds and 35 inches in major rivers, are an important warm-water sports fish. Nearly 715,000 catfish were harvested in 1970. Other species, such as muskellunge and northern pike, have been introduced from time to time but are still not widely distributed.

In addition to being a game fish, the channel catfish has commercial value. Investigations were first initiated in 1966 to determine the feasibility of opening the Ohio River to commercial fishing. Results showed that the river contained an adequate catfish population to support a commercial fishery, but tests rated the fish low in both taste and odor. Nevertheless, in 1969, two commercial licenses were sold and 3,250 pounds of fish were harvested. Seventy-five percent of the harvest were channel catfish. Eight licenses were issued and 13,970 pounds of fish were harvested in 1970, 83 percent was channel catfish. Commercial fishing was suspended in August 1970 when inspectors found unsafe levels of mercury in freshly harvested fish.

Present warm-water management efforts are keyed to the protection and maintenance of habitat quality along the 6,870 miles of warm-water rivers and streams that now contain fish populations, restoration of warm-water habitat which is too polluted to support game fish, and the reintroduction of game fish into rehabilitated waterways.

Reservoirs and small impoundments. Of the 220 square miles of surface water area in West Virginia, 53 are in impoundments. The Department of Natural Resources manages 106 ponds that contain nearly 15,000 acres of water surface. All of these ponds are open to the public for fishing and contain populations of largemouth bass and bluegills. Many ponds have been stocked with trout and catfish.

Eight large reservoirs, containing over 12,000 acres of water surface, have been constructed by the Corps of Engineers and several local power companies for flood control and power generating purposes. These reservoirs are open for public fishing and contain generally good populations of bass, panfish, and catfish, supplemented by stockings of walleye, muskie, and northern pike. Acid mine drainage is a major fish management problem. Currently, fishery biologists estimate that over a third of the total water surface area of these reservoirs is grossly polluted. (W. Va. Dep. Natural Resources 1973)

Most of the impoundments that have been constructed on private lands are farm ponds either assisted by the Soil Conservation Service or constructed under Public Laws 566 or 534 for soil conservation purposes. Soil Conservation Service records show that 19,822 farm ponds have been constructed with a total surface area of 5,937 acres. A total of 117 P. L. 566 and P. L. 534 impoundments containing some 1,014 acres have been constructed on private lands.

The supply of game fish in impoundments is limited by the area and productivity of the habitat and the ability of the fish population to grow and reproduce under different levels of water quality. The construction of new impoundments usually adds to the supply of desirable fish habitat, especially in the first few years after construction; dredging, siltation, and pollution remove the affected habitat from a productive status.

Habitat requirements and some of the management strategies that may improve the local habitat of some of the important game fish are listed:

Fish species	Habitat requirements and special problems	Positive management strategies
Trout	Requires water temperatures of less than 70° F. and dissolved oxygen of at least 5 ppm. High mineralization has limited reproduction and pollution has destroyed natural habitat.	Rehabilitation of coldwater streams.
Channel catfish	Flourishes in large, deep, low-gradient rivers with clean bottoms of sand, gravel, or boulders. Industrial pollution and high population densities are detrimental to survival and growth.	Stock large man-made impoundments. Encourage commercial harvesting in high population streams.
Muskellunge	Prefers slow flowing, low-gradient streams with long, deep pools that contain submerged brush or logs. These streams range in pH from 6.5 to 7.5, have total alkalinity of 20 to 50 ppm, and hardness of 15 to 75 ppm. Major impoundments and high streamflows destroy habitat and adversely affect reproduction.	Stocking program to expand limited range in West Virginia.
Walleye	Requires large, swift-flowing, clear rivers or deep, clear lakes with gravel, rock, or hard clay bottoms. Siltation of hard bottoms and increased turbidity destroys natural habitat.	Rehabilitation of polluted rivers that otherwise are good habitat. Stock large man-made impoundments.
Largemouth bass	Prefers warm, shallow, mud-bottomed lakes with lush aquatic vegetation and over-hanging, brush-covered banks.	Maintain and improve existing population by encouraging larger harvests and introducing forage species.
Smallmouth bass	Prefers cool flowing streams and large, clear lakes with pH range of 6.7 to 8.5. Acid mine drainage has destroyed the fishery in many West Virginia streams.	Rehabilitation of polluted streams and reintroduction of bass.

RESOURCE MANAGEMENT OPPORTUNITIES

In the previous sections we have presented the current timber resource situation in detail and have predicted how the inventory might look in 2005 if current growth and removal levels are maintained. The current land, water, outdoor recreation, and wildlife situations have also been presented. I have stressed that some natural resource uses are compatible, while others sometimes conflict. In the end, what happens to the land will be determined by public land administrators and private landowners. Obviously, the management of public lands and that of private lands must complement each other if maximum benefits are to be realized from the land. West Virginians have the dual responsibility of managing the land to produce their daily needs and livelihood, and at the same time striving to maintain the quality of their environment. On Federal lands within the State, regional natural-resource needs must also be considered.

In the August 1977 issue of "Wonderful West Virginia", Dave Callaghan, Director of the West Virginia Department of Natural Resources, put it this way:

> Of the few classes of renewable natural resources, our forests are among the most vital life-giving life-preserving. And this vital resource grows with every tick of the clock. I've long felt the role of our woodlands in the 'environmental story' has not been emphasized nor 'dramatized' enough. Sadly, too many people see our woodlands as simply 'a bunch of trees', not properly realizing their importance to life . . . . . it is well to remember that living trees provide food for humans and wildlife, homes for raccoons, birds, bear and deer. Foliage 'breathes' and consumes carbon dioxide and emits vital oxygen. Our mountain forests shade fallen snow and retard melting; water seeping and filtering through the forest floor of leaves and mosses gives us crystal-clear streams for trout and other wildlife. Perhaps the esthetic value and beauty of a forest are intangible, but it would be a dull person indeed who did not appreciate the red-gold of maple in the fall, the perennial green of a stately spruce or a graceful elm. It is merely hard realism to point out the most obvious use of a tree is for sawtimber and the multitude of by-products. Wood goes into more than 5,000 different products valued in the billions of dollars each year. To consider one local example, it takes 40 to 50 acres of pulp timber to produce one circulation of the Sunday, Charleston Gazette-Mail. And there is no foreseeable shortage of pulpwood for paper making; thanks to the 'growing qualities' of woodlands. In the old days when only virgin or prime trees were harvested, the 'cut-and-get-out' philosophy used only about 50 percent of a cut tree; today 80 percent of the trunk and limbs is utilized.

For each parcel of land, the options for management should be examined; compatible uses based on the location, physical attributes, and limitations of the site should be identified, and an overall management strategy should be developed to assure complete utilization of each acre and a balanced statewide natural-resources program. A team of Forest Service researchers has developed a series of management options for the central Appalachians (Trimble et al. 1974). West Virginia is in the center of the management area and much of the research was conducted at Forest Service research laboratories in the State. This multiple-use management guide has direct application to current management problems. Evaluations are included for the major forest ecosystems found in the State.

LITERATURE CITED AND RESOURCE REFERENCES

Appalachian Regional Commission.
1966. **Evaluation of timber development organizations.** Mac Donald Asso. Inc., Washington, D.C., Appalachian Res. Rep. 1, 186 P., illus.

Auburtin, G. M. and J. H. Patric.
1974. **Water quality after clearcutting a small watershed in West Virginia.** J. Environ. Qual. 3(3)243-249, Madison Wis.

Baumgardner, R. D. and Dan E. Steiner.
1974. **Cabin creek: Water spectrum.** 6(2)32-38. U.S. Dep. Army, Corps. Eng., Washington, D.C.

Birch, Thomas W. and Neal P. Kingsley.
1978. **The forest-land owners of West Virginia.** U.S. Dep. Agric. For. Serv. Resour. Bull NE-58. 64 p., illus.

Bones, James T. and Ralph Glover.
1977. **The timber industries of West Virginia.** U.S. Dep. Agric. For. Serv. Resour. Bull NE-47, 16 p., illus.

Core, Earl L.
1966. **Vegetation of West Virginia.** McClain Printing Co., Parsons, W. Va. 217 p., illus.

Davis, Grant and W. H. Davidson.
1968. **Coal-mine spoil banks offer good potential for timber and wildlife production.** Pa. For. 58(1)20-21.

Dickerson, W. H. and R. O. Weedfall.
1968. **Everybody talks about it.** W. Va. Agric. For. 1(2): 1-6.

Ferguson, Roland H.
1964. **The timber resources of West Virginia.** U.S. Dep. Agric. For. Serv. Resour. Bull. NE-2, 123 p., illus.

Frye, P. M. and G. S. Runner.
1970. **A proposed streamflow data program for West Virginia.** U.S. Dep. Interior, Geol. Surv., Charleston, W. Va., Water Resour. Div. Open-file Rep. 38 p., illus.

Gill, John D., Richard M. Degraaf, and Jack W. Thomas.
1974. **Forest habitat management for nongame birds in central Appalachia.** U.S. Dep. Agric. For. Serv. Res. Note NE-192, 6 p., illus.

Gill, John D., Jack W. Thomas, William M. Healy, James C. Pack, and H. Reed Sanderson.
1975. **Comparison of seven forest types for game in West Virginia.** J. Wildl. Manage. 39(4) 762-768.

Goudy, William H.
1975. **Mourning doves: Hunted by few, admired by all.** Wonderful W. Va. 75(9) 30-31.

Kingsley, Neal P. and David R. Dickson.
1968. **Timber products production in West Virginia—1965.** U.S. Dep. Agric. For. Serv. Resour. Bull. NE-10, 52 p., illus.

Kochenderfer, J. N. and J. H. Patric.
1970. **Effects of clearcutting past and present on water resources of the Monongahela National Forest.** W. Va. Agric. For. 3(3): 4-11.

Kochenderfer, James N. and Gerald M. Aubertin.
1975. **Effects of management practices on water quality and quantity: Fernow Experimental Forest.** W. Va., P. 14-24 in Munic. Watershed Manage. Symp. Proc. U.S. Dep. Agric. For. Serv. Tech. Rep. NE-13.

Lull, Howard W.
1971. **Runoff from forest lands.** *In* Man's impact on terrestrial and oceanic ecosystems. W. H. Matthews, F. F. Smith, and E. D. Goldbergs, eds. MIT Press, Cambridge, Mass.

Murphy, Dean A. and Hewlette S. Crawford.
1970. **Wildlife foods and understory vegetation in Missouri's national forests.** MO. Dep. Conserv. Tech. Bull. No. 4. 47 p., illus.

Patric. James H.
1977. **Soil erosion and its control in eastern woodlands.** North. Logger 25(11) 4-5, 22-23, 31.

Riffe, Jan E.
1971. **Hunting survey.** W. Va. Dep. Nat. Resour., Elkins, W. Va., Wildlife Res. Div. Unpub. Rep. FS-4R-2, III-I.

Shaw, Samuel P.
1971. **Wildlife and oak management,** p. 84-89 *in* Oak Symp. Proc. U.S. Dep. Agric. For. Serv. Northeastern For. Exp. Stn., Upper Darby, Pa.

Steer, Henry B.
1948. **Lumber production in the United States, 1799-1946.** U.S. Dep. Agric. For. Serv., Washington D.C. Misc. Pub. 669, 233 p., illus.

Trimble, George R., Jr., James Patric, John D. Gill, George H. Moeller, and James N. Kochenderfer.
1974. **Some options for managing forest land in the central Appalachians.** U.S. Dep. Agric. For. Serv. Gen. Tech. Rep. NE-12, 42 p., illus.

U. S. Forest Service.
1970. **Managing woodlands for wildlife.** U.S. Dep. Agric. For. Serv. Northeast. Area, S&PF, Upper Darby, Pa.

U. S. Forest Service.
1975a. **Land use plan for the Monongahela National Forest (draft copy).** U.S. Dep. Agric. For. Serv., Elkins, W. Va., 182 p., illus.

U. S. Forest Service.
1975b. **The Monongahela decision.** U.S. Dep. Agric. For. Serv., Elkins, W. Va., 14 p., illus.

West Virginia Department of Natural Resources.
1973. **Wildlife resources plan: Fishery species status and recommendations.** W. Va. Wildl. Res. Div., Elkins, W. Va., Vol. 3, 175 p., illus.

West Virginia Department of Natural Resources.
1974. **Wildlife resources plan: Terrestrial species status and recommendations.** W. Va. Wildl. Res. Div., Elkins, W. Va., Vol. 3, 205 P., illus.

West Virginia Forest Management Practices Commission.
1970. **Report on forest management practices on national forest lands in West Virginia.** W. Va. Legislature, Charleston. 48 p.
West Virginia Office of Federal-State Relations.
1975. **Statewide comprehensive outdoor recreation plan.** Outdoor Recreation Div., Charleston, W. Va., 246 p., illus.
White, David E.
1968. **Forest management and the ruffed grouse.** W. Va. Agric. For. 1(1) 10-14.
Wray, Robert D.
1952. **Forest statistics for West Virginia.** Northeast. For. Exp. Stn., Upper Darby, Pa. U.S. Dep. Agric. For. Serv. For. Stat. Serv.: W. Va. 1, 48 p., illus.

APPENDIX

Definition of terms

Land area classes

Land area. (a) Bureau of the Census. The area of dry land and land that is temporarily or partly covered by water, such as marshes, swamps, and river flood plains; streams, sloughs, estuaries, and canals that are less than 1/8 statute mile in width; and lakes, reservoirs, and ponds that are less than 40 acres in area. (b) Forest Survey. The same as the Bureau of the Census, except that the minimum width of streams, etc., is 120 feet, and the minimum size of lakes, etc., is 1 acre.

Forest land. Land that is at least 16.7 percent stocked (contains at least 7.5 square feet of basal area) by forest trees of any size, or that formerly had such tree cover and is not currently developed for nonforest use. (Forest trees are woody plants that have a well-developed stem and usually are more than 12 feet in height at maturity.) The minimum area for classification of forest land is 1 acre.

Commercial forest land. Forest land that is producing or capable of producing crops of industrial wood (more than 20 cubic feet per acre per year) and is not withdrawn from timber utilization. (Industrial wood: all roundwood products except fuelwood.)

Noncommercial forest land. Forest land that is incapable of yielding timber crops because of adverse site conditions (unproductive forest land), and productive forest land that is withdrawn from commercial timber use (productive-reserved forest land).

Productive-reserved forest land. Forest land that is sufficiently productive to qualify as commercial forest land, but is withdrawn from timber utilization through statute, administrative designation, or exclusive use for Christmas-tree production.

Unproductive forest land. Forest land that is incapable of producing 20 cubic feet per acre per year of industrial wood under natural conditions, because of adverse site conditions.

Nonforest land. Land that has never supported forests, and land formerly forested but now in nonforest use such as for crops, improved pasture, residential areas, and the like.

Ownership classes

National forest. Federal lands that have been legally designated as national forests or purchase units and other lands that are under the administration of the Forest Service.

Other federal. Lands (other than national forests) that are administered by Federal agencies.

State. Lands that are owned by the State of West Virginia or leased to the State for 50 years or more.

County and municipal. Lands that are owned by counties and local public agencies or municipalities or leased to them for 50 years or more.

Forest industry. Lands that are owned by companies or individuals operating wood-using plants.

Farmer-owned. Lands that are owned by farm operators, whether part of the farmstead or not. Excludes land leased by farm operators from nonfarm owners.

Miscellaneous private. Privately owned lands other than forest-industry and farmer-owned lands.

Stand, size classes

Stand. A growth of trees (see definitions under "Tree Classes") on a minimum of 1 acre of forest land that is at least 16.7 percent stocked by forest trees of any size.

Sawtimber stands. Stands that are at least 16.7

percent stocked with growing-stock trees, with half or more of total stocking in sawtimber or poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

Poletimber stands. Stands that are at least 16.7 percent stocked with growing-stock trees, of which half or more of this stocking is in poletimber and/or sawtimber trees and with poletimber stocking exceeding that of sawtimber.

Sapling-seedling stands. Stands that are at least 16.7 percent stocked with growing-stock trees, of which more than half of the stocking is saplings and/or seedlings.

Nonstocked areas. Commercial forest land that is less than 16.7 percent stocked with growing-stock trees.

Stocking classes

Stocking. The degree of occupancy of land by trees, measured in terms of basal area of trees in a stand compared to the minimum basal area of trees required to utilize fully the growth potential of the land. The actual stocking at a point was evaluated against a standard of 75 square feet of basal area per acre (see definition of basal area under "Tree measurement and volume"). The stocking percentage for a sample plot is the aggregate of the stocking for each of the 10 points. Three categories of stocking are used:

All live trees. These are used in the classification of forest land and forest types.

Growing-stock trees. These are used in the classification of stand-size classes.

Desirable trees. These are used in the classification of area-condition classes.

The degree of plot stocking is viewed as a range of values rather than single points. A fully stocked stand lies within the range of 100 to 133 percent of the basal-area standard. An overstocked stand contains more than 133 percent. The range for medium stocking is 60 to 100 percent and for poor stocking is 16.7 to 60 percent of the basal-area standard. Forest land with less than 16.7 percent of the basal-area standard is classed as nonstocked.

Tree classes

Forest trees. Woody plants that have a well-developed stem and usually are more than 12 feet in height at maturity.

Commercial species. Tree species that are presently or prospectively suitable for industrial wood products. Excludes species of typically small size, poor form, or inferior quality, such as hawthorn and sumac.

Growing-stock trees. Live trees of commercial species that are classified as sawtimber, poletimber, saplings and seedlings; that is, all live trees of commercial species except rough and rotten trees. (See definitions under "Class of timber.")

Acceptable trees. Growing-stock trees of commercial species that meet specified standards of size and quality, but do not qualify as desirable trees.

Desirable trees. Growing-stock trees of commercial species (a) that have no serious quality defects that limit present or prospective use for timber products, (b) that are of relatively high vigor, and (c) that contain no pathogens that may result in death or serious deterioration before rotation age.

Rotten trees. Live trees of commercial species that do not contain at least one 12-foot sawlog or two noncontiguous sawlogs, each 8 feet or longer, now or prospectively, and do not meet regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of the cull volume in a tree is rotten.

Rough trees. (a) The same as above, except that rough trees do not meet regional specifications for freedom from defect primarily because of roughness or poor form, and (b) all live trees of noncommercial species.

Site-quality classes

Site class. A classification of forest land in terms of inherent capacity to grow crops of industrial wood. Classifications are based upon the mean annual growth of growing stock attainable in fully stocked natural stands at the culmination of mean annual growth.

Forest types

Forest type. A classification of forest land based upon the species forming a plurality of basal area of live trees. The many local forest types in West Virginia were combined into the following major forest types:

White and red pine. Forests in which eastern white pine, red pine, or jack pine, singly or in combination, make up a plurality of the stocking.

A common associate is hemlock. Important local types included in this major type in West Virginia are the white pine and hemlock types.

Spruce-fir. Forests in which spruce or true firs, singly or in combination, make up a plurality of the stocking. Common components of this type in West Virginia are red spruce and balsam fir.

Virginia and pitch pine. Forests in which loblolly pine, shortleaf pine, Virginia pine, and pitch pine, singly or in combination, make up a plurality of the stocking. The dominant local type included in this major type in West Virginia is the Virginia pine type.

Oak-pine. Forests in which hardwoods (usually upland oaks) form a plurality of the stocking but in which pines make up 25 to 50 percent of the stocking. Important local types included in this major type in West Virginia are the Virginia pine-southern red oak, and other oak-pine types.

Oak-hickory. Forests in which upland oaks or hickory, singly or in combination, make up a plurality of the stocking. A common associate is yellow-poplar. Important local types included in this major type in West Virginia are the white oak-red oak-hickory, chestnut oak, sweetgum—yellow-poplar, and mixed hardwood types.

Elm-ash-cottonwood. Forests in which elm, ash, and cottonwood, singly or in combination, make up a plurality of the stocking. The dominant local type included in this major type in West Virginia is the black ash-elm-red maple type, but the river birch-sycamore type is also included.

Maple-beech-birch. Forests in which maple, beech, or yellow birch, singly or in combination, make up a plurality of the stocking. The dominant local type included in this major type in West Virginia is the sugar maple-beech-yellow birch type, but the black cherry and the black walnut types are also included.

Aspen-birch. Forests in which aspen, balsam poplar, paper birch, or gray birch, singly or in combination, make up a plurality of the stocking. The dominant local type included in this major type in West Virginia is the aspen type.

Class of timber

Softwoods. Coniferous trees that are usually evergreen, having needles or scalelike leaves.

Hardwoods. Dicotyledonous trees that are usually broad-leaved and deciduous.

Sawtimber trees. Live trees of commercial species, (a) that are of the following minimum diameters at breast height—softwoods 9.0 inches and hardwoods 11.0 inches, and (b) that contain at least one 12-foot or two noncontiguous 8-foot merchantable sawlogs and that meet regional specifications for freedom from defect.

Poletimber trees. Live trees of commercial species that meet regional specifications of soundness and form, and are at least 5.0 inches d.b.h. but are smaller than sawtimber size.

Saplings. Live trees of commercial species that are 1.0 to 5.0 inches in diameter at breast height and of good form and vigor.

Seedlings. Live trees of commercial species that are less than 1.0 inch in diameter at breast height and are expected to survive.

Rough and rotten trees. See definitions under "Tree classes."

Timber measurement and volume

Basal area. The area in square feet of the cross-section at breast height of a single tree, or of all the trees in a stand, usually expressed as square feet of basal area per acre.

Board foot. A unit of lumber measurement 1 foot long, 1 foot wide, and 1 inch thick, or its equivalent. By forest-survey convention, softwoods less than 9.0 inches dbh and hardwoods less than 11.0 inches dbh do not contain board-foot volume.

Diameter at breast height (dbh). The diameter outside bark of a standing tree measured at 4 1 2 feet above the ground.

Growing-stock volume. Net volume, in cubic feet, of live growing-stock trees that are 5.0 inches dbh and over, from a 1-foot stump to a minimum 4.0-inch top diameter outside bark of the central stem, or to the point where the central stem breaks into limbs. Net volume equals gross volume less deduction for rot and/or sweep and crook.

International 1/4-inch rule. A log rule, or formula, for estimating the board-foot volume of logs. Stated mathematically, the formula is ((D $\times$ 0.22) $-$ 0.71 D) $\times$ 0.904762 for 4-foot sections, where D is the diameter inside bark at the small end of the 4-foot section. The International 1/4-inch rule is used as the USDA Forest Service standard log rule in the northeastern United States.

Standard cord. A unit of measure for stacked bolts of wood, encompassing 128 cubic feet of wood, bark, and air space. Cord estimates can be

derived from cubic-foot estimates of growing stock by applying an average factor of 80 cubic feet of wood (inside bark) per rough cord.

Sawtimber volume. Net volume in board feet, International 1/4-inch rule, of merchantable sawlogs in live sawtimber trees. Net volume equals gross volume less deductions for rot, sweep, and other defects that affect use for lumber.

Sawlog. A log that meets minimum standards of diameter, length, and defect, including logs at least 8 feet long, and with a minimum diameter inside bark of 6 inches for softwoods and 8 inches for hardwoods. (See specifications under "Log grade classification.")

Sawlog portion. That part of the bole of a sawtimber tree between a 1-foot stump and the sawlog top.

Sawlog top. The point on the bole of a sawtimber tree above which a sawlog cannot be produced. The minimum sawlog top is 7.0 inches dob (diameter outside bark) for softwoods and 9.0 inches dob for hardwoods.

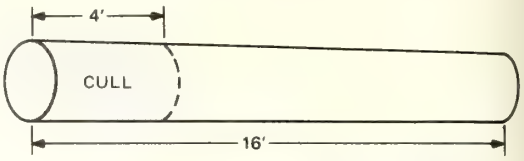
Upper-stem portion. That part of the main stem or fork of a sawtimber tree above the sawlog top to a diameter of 4.0 inches outside bark or to the point where the main stem or fork breaks into limbs.

Log grade classification

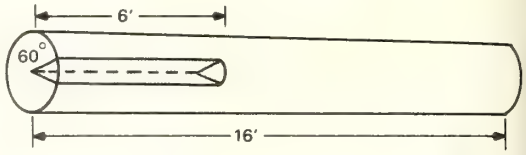
Log grades are based on external characteristics indicative of quality of value. The log-grade standards and grading systems for softwood and hardwood species used in this forest survey of West Virginia are shown on the following pages.

Methods of determining scaling deduction.

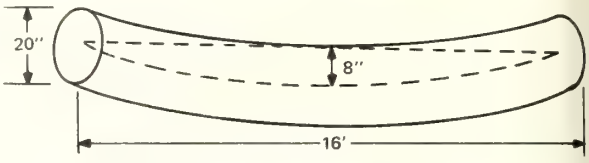
(Examples based on a 16-foot log with 20-inch scaling diameter)



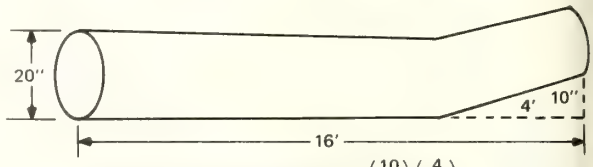
Defect section (rule 1): Percent deduction = $\frac{4}{16}$ = 25%



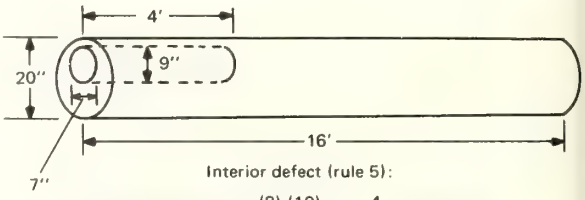
Defect section (rule 2): Percent deduction = $\left(\frac{6}{16}\right)\left(\frac{60}{360}\right)$ = 6-1/4



Sweep (rule 3): Percent deduction = $\frac{8-2}{20}$ = 30%



Crook (rule 4): Percent deduction = $\left(\frac{10}{20}\right)\left(\frac{4}{16}\right)$ = 12-1/2%



Interior defect (rule 5):

Percent deduction = $\frac{(8)(10)}{(20-1)^2} \times \frac{4}{16}$ = 5-5/9%

In practice each elipse axis can be divided by (20–1)

Thus $\frac{8}{19}$ = .4, $\frac{10}{19}$ .5, and (.4) (.5) $\left(\frac{4}{16}\right)$ = 5%

From: Grosenbaugh, L.R. 1952. Shortcuts for cruisers and scalers. U.S. Dep, Agric. For. Serv. South. For Exp. Stn. Occas. Pap. 126.

SOUTHERN PINE SAWLOGS

Grade 1. Logs with 3 or 4 clear faces.[1] Code 1.

Grade 2. Logs with 1 or 2 clear faces. Code 2.

Grade 3. Logs with no clear faces. Code 3.

After the tentative log grade is established from above, the log will be degraded one grade for each of the following, except that no log can be degraded below grade 3.

1. *Sweep.* Degrade any tentative 1 or 2 log one grade if sweep amounts to 3 or more inches and equals or exceeds one third (1/3) the diameter inside bark at small end. This is the final grade if there is no evidence of heart rot.

2. *Heart rot.* Degrade any tentative 1 or 2 log one grade if conk, massed hyphae, or other evidence of advanced heart rot is found anywhere in it.

[1] A face is one-fourth of the circumference in width extending full length of the log. Clear faces are those free of: knots measuring more than one-half inch in diameter, overgrown knots of any size, holes more than one-fourth inch in diameter. The faces may be rotated if necessary to obtain the maximum number of clear ones.

Source: Schroeder, J. G., R. A. Campbell, and R. C. Rodenbach. 1968. **Southern pine log grades for yard and structural lumber.** U.S. Dep. Agric. For. Serv. Res. Pap. SE-39.

EASTERN WHITE PINE SAWLOG GRADE SPECIFICATIONS

GRADING FACTOR	LOG GRADE 1	LOG GRADE 2	LOG GRADE 3	LOG GRADE 4
(1) MINIMUM SCALING DIAMETER (inches)	14[1]	6	6	6
(2) MINIMUM LOG LENGTH (feet)	10[2]	8	8	8
(3) MAXIMUM WEEVIL INJURY (number)	None	None	2 injuries[3]	No limit
(4) MINIMUM FACE REQUIREMENTS	Two full length or four 50% length good faces.[4] (In addition, log knots on balance of faces shall not exceed size limitations of grade 2 logs.)	No GOOD FACES REQUIRED. Maximum diameter of log knots on three best faces SOUND RED KNOTS not to exceed 1/6 scaling diameter and 3 inch maximum. DEAD OR BLACK KNOTS including overgrown knots not to exceed 1/12 scaling diameter and 1½ inch maximum.	SOUND RED KNOTS not to exceed 1/3 scaling diameter and 5 inch maximum. DEAD OR BLACK KNOTS including overgrown knots not to exceed 1/6 scaling diameter and 2½ inch maximum.	Includes all logs not qualifying for No. 3 or better and judged to have at least one-third of their gross volume in sound wood suitable for manufacture into standard lumber.
(5) MAXIMUM SWEEP OR CROOK ALLOWANCE (percent)	20	30	40	66⅔
(6) MAXIMUM TOTAL SCALING DEDUCTION (percent)	50	50	50	66⅔

After the tentative log grade is established from face examination, the log will be reduced in grade whenever the following defects are evident:

(7) CONKS, PUNK KNOTS, AND PINE BORER DAMAGE ON BARK SURFACE[5]

Degrade one grade if present on one face.
Degrade two grades if present on two faces.
Degrade three grades if present on three or more faces.

(8) LOG END DEFECTS: RED ROT, RING SHAKE, HEAVY STAIN AND PINE BORER DAMAGE OUTSIDE HEART CENTER OF LOG[5]

Consider log as having a total of 8 quarters (4 on each end) and degrade as indicated below:
Degrade one grade if present in 2 quarters of log ends.
Degrade two grades if present in 3 or 4 quarters of log ends.
Degrade three grades if present in 5 or more quarters of log ends.

[1] 12 and 13 inch logs with four full length good faces are acceptable.
[2] 8 foot logs with four full length good faces are acceptable.
[3] 8 foot No. 3 logs limited to one weevil injury.
[4] Minimum 50% length good face must be at least 6 feet.
[5] Factors 7 and 8 are not cumulative (total degrade based on more serious of the two). No log to be degraded below grade 4 if net scale is at least one-third gross log scale.

Source: Ostrander, M. D., and R. L. Brisbin. 1971. **Sawlog grades for Eastern white pine.** U.S. Dep. Agric. For. Serv. Res. Pap. NE-205.

SPRUCE, FIR, HEMLOCK, TAMARACK, AND CEDAR LOG GRADE
(Minimum merchantability specifications)

Log grade	Minimum size		Defect allowance		Other requirements
	Diameter[1]	Length[2]	Sweep or crook	Total deduction	
	Inches	Feet	Percent	Percent	
1	10-12	8-16 in 2-foot multiples	25	50	Sound knots not over 2 inches in diameter permitted. Shake permitted up to 20 percent of gross scale if not combined with other serious defects.
	13+	8-16 in 2-foot multiples	25	50	Sound knots not over 3 inches in diameter permitted. Shake permitted up to 20 percent of gross scale if not combined with other serious defects.

[1]At small end of log.
[2]Without trim.

STANDARD GRADES FOR HARDWOOD FACTORY LUMBER LOGS.[a]

Grading Factors		Log grades							
		F1			F2				F3
Position in tree		Butts only	Butts & uppers		Butts & uppers				Butts & uppers
Scaling diameter, inches		13-15[b]	16-19	20+	11+[c]	12+			8+
Length without trim, feet		10+			10+	*8-9*	*10-11*	*12+*	8+
Required clear cuttings[d] of each of 3 best faces[e]	Min. length, feet	7	5	3	3	3	3	3	2
	Max. number	2	2	2	2	2	2	3	No limit
	Min. proportion of log length required in clear cutting	5/6	5/6	5/6	2/3	3/4	2/3	2/3	1/2
Maximum sweep & crook allowance	For logs with less than 1/4 of end in sound defects	15%			30%				50%
	For logs with more than 1/4 of end in sound defects	10%			20%				35%
Maximum scaling deduction		40%[f]			50%[g]				50%

End defects, although not visible in standing trees, are important in grading cut logs. Instructions for dealing with this factor are contained in Forest Prod. Lab. Rpt. D 1737.
[a]From USDA Forest Service Research Paper FPL-63 (13).
[b]Ash and basswood butts can be 12 inches if they otherwise meet requirements for small #1's.
[c]Ten-inch logs of all species can be #2 if they otherwise meet requirements for small #1's.
[d]A clear cutting is a portion of a face, extending the width of the face, that is free of defects.
[e]A face is 1/4 of the surface of the log as divided lengthwise.
[f]Otherwise #1 logs with 41-60% deductions can be #2.
[g]Otherwise #2 logs with 51-60% deductions can be #3.

STANDARD SPECIFICATIONS FOR HARDWOOD CONSTRUCTION LOGS.[a]

Position in tree		Butt & upper
Min. diameter, small end		8 inches +
Min. length, without trim		8 feet
Clear cuttings		No requirements.
Sweep allowance, absolute		1/4 diameter small end for each 8 feet of length.
Sound surface defects	Single knots	Any number, if no one knot has an average diameter above the callus in excess of 1/3 of log diameter at point of occurrence.
	Whorled knots	Any number if sum of knot diameters above the callus does not exceed 1/3 of log diameter at point of occurrence.
	Holes	Any number provided none has a diameter over 1/3 of log diameter at point of occurrence, and none extends over 3 inches into included timber.[b]
Unsound surface defects		Same requirements as for sound defects if they extend into included timber.[b] No limit if they do not.
End defects	Sound	No requirements.
	Unsound	None allowed; log must be sound internally, but will admit 1 shake not to exceed 1/4 the scaling diameter and a longitudinal split not extending over 5 inches into the contained timber.

[a]These specifications are minimum for the class. If, from a group of logs, factory logs are selected first, thus leaving only non-factory logs from which to select construction logs, then the quality range of the construction logs so selected is limited, and the class may be considered a grade. If selection for construction logs is given first priority, then it may be necessary to subdivide the class into grades.

[b]Included timber is always square, and dimension is judged from small end.

From: Rast, E. D., D. L. Sonderman, and G. L. Gammon, A GUIDE TO HARDWOOD LOG GRADING (REVISED) USDA For. Serv. Gen. Tech. Rep. NE-1, 1973.

Annual net growth and timber removals

(In cubic feet for growing stock and in board feet for sawtimber)

Average annual net growth. The change (resulting from natural causes) in net volume during the period between surveys, divided by the number of years in the period. Components of annual net growth include the increment in net volume of trees present at the beginning of the period and surviving to its end, plus net volume of trees that attain the minimum size to enter the class during the period, minus the net volume of trees that died during the period, minus the net volume of trees that became rough or rotten trees during the period.

Average annual ingrowth. The net volume of trees now included in the class that were not tallied as such on the initial survey, divided by the number of years between surveys.

Average annual cull increment. The net volume of trees that became rough or rotten trees during the period between surveys, divided by the number of years between surveys.

Average annual mortality. The net volume removed from the class because of death from natural causes during the period between surveys, divided by the number of years between surveys.

Average annual removals. The net volume of trees harvested or killed in logging, cultural operations such as timber-stand improvement, land-clearing, or changes in land use during the period between surveys, divided by the number of years between surveys.

Current annual net growth, removals, and mortality. The estimated level of annual growth, removals, and mortality on commercial forest land during the year of the most recent inventory (1974 for West Virginia).

Logging residues. The unused growing-stock volume of trees cut for products and the total growing-stock volume of trees cut for products and the total growing-stock volume of trees destroyed in the course of logging but not removed for products.

Other removals. The growing-stock volume of trees that were removed from the inventory (and not used for products) by cultural operations (weeding, thinning, etc.), land-clearing, and reclassification of some commercial forest land as noncommercial forest land.

Plant byproducts. Wood products such as slabs, edgings, and veneer cores that are incidentally produced in the production of timber products and are utilized in the manufacture of other timber products. (Bark is not included.)

Plant residues. Wood material incidentally produced in the production of timber products but not utilized.

Roundwood products. Logs, bolts, or other round sections cut from growing stock or nongrowing stock for industrial or nonindustrial uses.

Previous inventories

The initial inventory of West Virginia's forest resources was begun in 1948. Some 31,000 photo points were examined stereoscopically and classified by land use and density. Field crews located 3,034 of the photo points on the ground and 1/5-acre circular plots were established and monumented at all forested locations. Tree and area data were recorded at each location.

In 1959, a second West Virginia forest resource survey was begun. This inventory used the sampling-with-partial replacemnet (SPR) design. With this design, estimates of forest area and timber volume were made by combining a subsample of remeasured plots, a regression up-dating of the previous inventory, and a new independent photo- and ground-plot inventory. Thus the SPR design, by combining two independent estimates of the inventory, yielded a better estimate of West Virginia's timber resource at a given cost.

A portion (344) of the 1948 ground plots were remeasured and then used with appropriate regression techniques to update all of the 1948 plot estimates to 1961. At the same time, 13,500 photo points on recent photography were stratified into land use and volume classes. A total of 1,205 of the new photo points were located and monumented in the field, and 10-point BAF 40 prism sample plots were established at each forested sample location. The data collected on the new ground plots were expanded into an independent estimate of forest area and volume for West Virginia in 1961.

At this point the two independent estimates (based on remeasured and new ground plots) were combined, using a variance reciprocal weighting procedure to yield a single area and volume estimate with a lower combined sampling error than

either of the two separate estimates. The 1/5-acre remeasured plots were also used to estimate average annual growth, mortality, and removals; since each tree measured was reconciled and a tree history code assigned, they could be used to determine the components of change.

The 1973-74 inventory

A current set of aerial photographs for West Virginia was used to separate the State into land use, volume, and major forest-type strata. Approximately 20,000 photo points were classified, and when photo interpretation was completed, 978 forested points and 233 nonforest points were selected for ground sampling. A number of points proportional to the area in the photo stratum were chosen randomly within each stratum.

An estimate of current area and volume was calculated based upon the photographic points and ground plots. Growth and the other change components were developed from the remeasurement of 201 1/5-acre plots that were originally established in 1948, remeasured in 1961, and measured a third time in 1973-74. A tree-by-tree reconcilation was made on each remeasured plot to develop accurate tree histories for each remeasured stand.

County data

Many users of forest-survey data have shown a need for county information. To provide such information within the framework of the survey design, tables for counties where more than one county makes up a geographic stratum have been developed by a survey-unit partitioning technique.

First, the geographic stratum means and variances for the various photo-plot strata were applied to the photo-plot data for each county within the stratum. This yielded an estimate of total volume or total commercial forest-land area for each county. Next the data from all the new ground plots in each geographic stratum were used to partition the county totals into their various components. For example, if a table of cubic-foot volume by softwoods and hardwoods is to be made for a county, the estimate of total cubic-foot volume for that county is partitioned into softwood and hardwood totals according to the proportion of softwoods and hardwoods for all new forest-survey ground plots within the geographic stratum.

Data processing

Field-tally data consisting of plot and individual-tree information were processed and compiled into various tables, using FINSYS—Forest Inventory System—on modern large-capacity high-speed computers.

FINSYS is a data-processing system developed by the Northeastern Forest Experiment Station to process and compile large volumes of forest-inventory data. It consists of an editing subsystem that edits field-tally data for errors; a table-compiling subsystem that compiles tables from edited field data; and finally, the output subsystem that expands the plot data to geographic unit or statewide estimates and prints the final tables.

FINSYS was described by R.W. Wilson and R.C. Peters in 1967 in Forest Service Research Papers NE-61 and NE-71 to NE-78.

FINSYS has several features that make it unique. One of these is the ability to calculate not only inventory estimates but also the variance and sampling error for each estimate. This feature provides the user with a measure of the reliability of each statistic and the ability to determine the reliability of a new estimate based upon a data combination he may make.

Another feature of FINSYS is its flexibility. The system is not restricted to the Northeastern Forest Survey; it can be used for any large-scale forest inventory. Also, it does not produce a standard set of tables; the individual user specifies the tables to be developed according to his particular need. Thus, at any stage in the data processing phase, or even at a later date, a specific table can be developed with minimum effort.

Comparisons between inventories

After inventories have been completed for several points in time it is desirable to evaluate the trends between the several inventories and to make comparisons.

A comparison of the 1973-74 and 1961 forest-survey estimates of volume, growth, removals, and mortality was made for West Virginia. A computer program TRAS (Timber Resource Analysis System), was used. TRAS has been described in two publications by R.W. Larson and M.H. Goforth: TRAS, a computer program for the projection of timber volume (For. Serv. Agric. Hdbk. 377, June 1970) and TRAS, a timber

volume projection model (For. Serv. Tech. Bull. 1508, Dec. 1974).

Because of changes in the procedures and in definitions, it was necessary to adjust the 1961 inventory volume estimte to what it would have been had the 1973-74 procedures and definitions been used in 1961. One important step in this process is to multiply the average net volume per tree (for softwoods and for hardwoods) developed from the resurvey for each 2-inch diameter class by the number of trees in that diameter class in the 1961 inventory.

Volume estimates also differed between inventories because the definitions of what constitutes a merchantable sawtimber tree differed. In 1961, sawtimber trees had to contain at least one merchantable 8-foot sawlog; in 1974, at least one 12-foot sawlog or two noncontiguous 8-foot sawlogs were required. The changes in the 1961 volume estimates for West Virginia are as follows:

- For softwood growing stock, the adjusted volume is 2 percent less than reported.
- For hardwood growing stock, the adjusted volume is 2 percent less than reported.
- For softwood sawtimber, the adjusted volume is 14 percent less than reported.
- And for hardwood sawtimber, the adjusted volume is 24 percent less than reported.

The adjusted 1961 volume estimates, not the volume estimates published in the report for the 1961 resurvey, are used for comparisons between surveys in this report.

Reliability of the estimates

The forest-area and timber-volume data presented in this report were based upon a carefully designed sample of forest conditions throughout West Virginia. However, since neither every acre nor every tree in the region was measured, the data presented in this report are estimates. A measure of the reliability of these estimates is given by the sampling error calculated for this report. Many of these appear on the data tables.

Briefly, this is how the sampling error indicates the reliability of an estimate: Our estimate of the total growing-stock volume in West Virginia—13,515 million cubic feet—has an associated sampling error of 2 percent (270 million cubic feet). This means that our best estimate of the total growing-stock volume in West Virginia in 1975 is 13,515 million cubic feet. If there are no errors in procedure, the odds are 2 to 1 that, if we repeated the survey in the same way the resulting estimates of growing-stock volume would be betweeen 13,245 million and 13,785 million cubic feet (13,515 ± 270). Similarly, the odds are 19 to 1 that it would be within ± 541 million cubic feet and 300 to 1 that it would be within ± 811 million cubic feet.

The computed sampling error is not a complete measure of reliability; there are other sources of error that this term does not include. There could be imperfections in the volume tables and equations, and errors in field measurement. Procedural errors were kept to a minimum by careful training of all field personnel, frequent inspection of field work, and application of the most reliable survey methods.

Computed sampling errors for the totals shown in the statistical tables for West Virginia are:

	Sampling error (Percent)
Commercial forest area: 11,483.7 thousand acres	1
Growing-stock volume: 13,515.4 million cubic feet	2
Sawtimber volume: 27,630.8 million board feet	2
Annual net growth: 473.5 million cubic feet	8
Annual removals: 166.1 million cubic feet	15

Commercial tree species of West Virginia

Scientific name[3]	*Common name*	*Occurrence*[4]
	Softwoods	
Abies balsamea	Balsam fir	r
Juniperus virginiana	Eastern redcedar	r
Picea rubens	Red spruce	r
Pinus echinata	Shortleaf pine (Yellow)[5]	r
P. pungens	Table-Mountain pine	r
P. resinosa	Red pine	vr
P. rigida	Pitch pine	r
P. strobus	Eastern white pine	c
P. sylvestris	Scotch pine[6]	vr
P. virginiana	Virginia pine (Scrub)	c
Thuja occidentalis	Northern white-cedar	vr
Tsuga canadensis	Eastern hemlock	c
	Hardwoods	
Acer rubrum	Red maple (Soft)	vc
A. saccharinum	Silver maple	vr
A. saccharum	Sugar maple (Hard)	vc
Aesculus species	Buckeye	r
Betula alleghaniensis	Yellow birch	c
B. lenta	Sweet birch (Black)	c
B. nigra	River birch (Red)	vr
B. papyrifera	Paper birch (White)	vr
Carya species	Hickory	vc
Castanea dentata	American chestnut	r
Celtis occidentalis	Hackberry (Sugar berry)	r
Cornus florida	Flowering dogwood	c
Diospyros virginiana	Common persimmon	r
Fagus grandifolia	American beech	c
Fraxinus species	Ash	c
Gleditsia triacanthos	Honeylocust	vr
Ilex opaca	American holly	vr
Juglans cinerea	Butternut	r
J. nigra	Black walnut	c
Liquidambar styraciflua	Sweetgum	vr
Liriodendron tulipifera	Yellow-poplar (Tuliptree)	vc
Magnolia species	Magnolia	c
Nyssa sylvatica	Blackgum (Tupelo)	c
Platanus occidentalis	American sycamore (Buttonwood)	r
Populus deltoides	Eastern cottonwood	vr
P. grandidentata	Bigtooth aspen (Popple)	r
P. tremuloides	Quaking aspen (trembling)	r
Prunus serotina	Black cherry	c
Quercus alba	White oak (Stave)	vc
Q. bicolor	Swamp white oak	vr
Q. coccinea	Scarlet oak	c
Q. imbricaria	Shingle oak	vr

Continued

Scientific name[3]	*Common name*	*Occurrence*[4]
Q. macrocarpa	Bur oak	vr
Q. muehlenbergii	Chinkapin	vr
Q. palustris	Pin oak	vr
Q. prinus	Chestnut oak (Rock)	vc
Q. rubra	Northern red oak	c
Q. stellata var. stellata	Post oak	r
Q. velutina	Black oak (Yellow bark)	c
Robinia pseudoacacia	Black locust	c
Salix nigra	Black willow	vr
Tilia americana	American basswood (Linden)	c
Ulmus species	Elm	c

[3] Name according to: Little, Elbert L., Jr., Checklist of Native and Naturalized Trees of the United States (including Alaska). U.S. Dept. Agric. Handb. 41. 472 p. 1953.

[4] Occurrence is based on the frequency at which the species was encountered on forest survey field plots: vr—very rare, r—rare, c— common, and vc—very common.

[5] Names in parenthesis are other frequently used common names.

[6] Species introduced into West Virginia.

Metric equivalents of units used in this report

1 acre = 4,046.86 square meters or 0.405 hectare.
1,000 acres = 405 hectares.
1,000,000 acres = 405,000 hectares.
1,000 board feet (International 1/4-inch log rule) = 3.48 cubic meters.
1,000,000 board feet (International 1/4-inch log rule) = 3,480 cubic meters.
Breast height = 1.4 meters above ground level.
1 cubic foot = 28,317 cubic centimeters or 0.028317 cubic meter.
1,000 cubic feet = 28,317 cubic meters.
1,000,000 cubic feet = 28,317 cubic meters.
1 cord (wood, bark, and airspace) = 3.6246 cubic meters.
1 cord (solid wood, pulpwood) = 2.4069 cubic meters.
1 cord (solid wood, other than pulpwood) = 2.2654 cubic meters.
1,000 cords (pulpwood) = 2,406.9 cubic meters.
1,000 cords (other products) = 2,265.4 cubic meters.
1 foot = 30.48 centimeters or 0.3048 meter.
1 inch = 25.4 millimeters or 2.54 centimeters or 0.0254 meter.
1 mile = 1.609 kilometers.
1 square foot = 929.03 square centimeters or 0.0929 square meter.

Index to statistical tables for the State

Forest land

Table No.	
1	Area by land class
2	Ownership class
3	Stand-size and ownership class
4	Stand-volume and ownership class
5	Stocking class based upon components
6	Area-condition and ownership class
7	Growth-per-acre and ownership class
8	Forest type and ownership class
9	Forest type and stand-size class
10	Local forest type and major forest type
11	Noncommercial forest land by forest type
12	Number of trees by species group, tree class, and diameter class
13	Number of growing-stock trees by species and diameter class

Timber volume

14	Class of timber and species group
15	Ownership and stand-size classes by species group
16	Growing stock and sawtimber by forest type species group
17	Species and diameter class (growing stock)
18	Species and diameter class (sawtimber)
19	Species and quality class

Annual growth, removals, and mortality

20	Components of average annual net change of growing stock and sawtimber
21	Growth, removals, and mortality of growing stock and sawtimber by species
22	Growth and removals of growing stock and sawtimber by ownership and species group
23	Mortality of growing stock and sawtimber by ownership, cause, and species group
24	Sampling errors for tables 1 to 23

Output of timber products (by softwoods and hardwoods)

25	Timber products by source of material
26	Roundwood products by source
27	Growing stock and sawtimber removals
28	Unused residues by industry and type of residue
29 & 30	Projections of annual net growth, timber removals, and inventory of growing stock and sawtimber on commercial forest land

Statistical tables for geographic units

Forest land

31 Area by land class
32 Area by ownership class
33 Area by stand-size class
34 Area by forest type
35 Number of all trees by species group and diameter class
36 Growing-stock trees in Northeastern Unit by species and diameter class
37 Growing-stock trees in Southern Unit by species and diameter class
38 Growing-stock trees in Northwestern Unit by species and diameter class

Timber volume

39 Class of timber by geographic unit
40 Growing stock by ownership class, species, and geographic unit
41 Sawtimber by ownership class, species, and geographic unit
42 Growing stock by stand-size class, species, and geographic unit
43 Sawtimber by stand-size, species, and geographic unit
44 Growing stock by forest type and geographic unit
45 Sawtimber by forest type and geographic unit
46 Growing stock in Northeastern Unit by species and diameter class
47 Growing stock in Southern Unit by species and diameter class
48 Growing stock in Northwestern Unit by species and diameter class
49 Sawtimber in Northeastern Unit by species and diameter class
50 Sawtimber in Southern Unit by species and diameter class
51 Sawtimber in Northwestern Unit by species and diameter class
52 Sawtimber in Northeastern Unit by species and quality class
53 Sawtimber in Southern Unit by species and quality class
54 Sawtimber in Northwestern Unit by species and quality class

Annual growth and removals

55 Growth and removals of growing stock by species and geographic unit
56 Growth and removals of sawtimber by species and geographic unit

Statistical tables for counties

Forest land

57 Area by land class and geographic unit
58 Area by stand-size and geographic unit
59 Area by forest type and geographic unit

Timber volume

60 Growing stock by stand-size and geographic unit
61 Sawtimber by stand-size and geographic unit
62 Growing stock by forest type and geographic unit
63 Sawtimber by forest type and geographic unit
64 Growing stock by species and geographic unit
65 Sawtimber by species and geographic unit

Table 1.—*Area by land classes, West Virginia, 1975*

Land class	Area	
	Thousand acres	*Percent*
Forest land:		
Commercial	11,483.7	74
Productive reserved	115.5	1
Christmas tree land	8.9	([a])
Unproductive	24.5	([a])
Total forest land	11,632.6	75
Nonforest land:		
Cropland[b]	518.0	4
Pasture[b]	1,404.8	9
Other[c]	1,858.4	12
Total nonforest land	3,781.2	25
Total area[d]	15,413.8	100

[a] Less than 0.5 percent.

[b] Based on forest survey plots and Census of Agriculture historical data.

[c] Includes swampland, industrial and urban areas, other nonforest lands, and 29,700 acres, classed as water by forest survey standards, but defined by the Bureau of the Census as land.

[d] Source: United States Bureau of the Census, Areas of West Virginia: 1960 (April 1967).

Table 2.—*Area of commercial forest land, by ownership classes, West Virginia, 1975*

Ownership class	Area[a]	
	Thousand acres	*Percent*
National Forest	872.6	8
Other federal	39.1	( )
State	228.9	2
County and municipal	.2	( )
Total public	1,140.8	10
Forest industry	879.7	8
Farmer-owned	1,927.6	17
Miscellaneous private:		
Individual	4,787.8	42
Corporate	1,752.3	15
Other	995.5	9
Total private	10,342.9	90
All ownerships	11,483.7	100

[a] Estimates of area in each private ownership class are based on a forest-land ownership study by the Northeastern Forest Experiment Station.

[b] Less than 0.5 percent.

Table 3.—*Area of commercial forest land, by stand-size and ownership classes, West Virginia, 1975*

(In thousands of acres)

Stand-size class	All ownerships	National Forest	Other public	Forest industry	Farmer and other
Sawtimber stands	5,075.7	464.1	84.2	580.6	3,946.8
Poletimber stands	3,959.6	346.7	143.0	212.1	3,257.8
Sapling-seedling stands	2,306.1	45.4	36.0	87.0	2,137.7
Nonstocked areas	142.3	16.4	5.0	—	120.9
All classes	11,483.7	872.6	268.2	879.7	9,463.2

Table 4.—*Area of commercial forest land, by stand-volume and ownership classes, West Virginia, 1975*

(In thousands of acres)

Stand-volume per acre (board feet)[a]	All ownerships	National Forest	Other public	Forest industry	Farmer and other
Less than 1,500	4,577.8	104.9	117.8	214.1	4,141.0
1,500 to 5,000	4,962.8	328.7	119.8	428.6	4,085.7
More than 5,000	1,943.1	439.0	30.6	237.0	1,236.5
All classes	11,483.7	872.6	268.2	879.7	9,463.2

[a] International 1/4-inch rule.

Table 5.—*Area of commercial forest land, by stocking classes based on selected stand components, West Virginia, 1975*

(In thousands of acres)

Stocking class [a] (percent)	Stocking classified in terms of—				
	All trees	Growing-stock trees			Rough and rotten trees
		Total	Desirable	Acceptable	
160	18.0	—	—	—	—
150 to 160	209.2	11.6	—	—	—
140 to 150	854.6	49.7	—	29.2	8.9
130 to 140	1,863.2	186.5	—	56.2	—
Overstocked	2,945.0	247.8	—	85.4	8.9
120 to 130	2,501.7	579.0	—	270.4	—
110 to 120	2,464.0	989.4	—	606.7	18.7
100 to 110	1,562.5	1,665.2	—	1,191.7	46.7
Fully stocked	6,528.2	3,233.6	—	2,068.8	65.4
90 to 100	1,061.8	1,902.5	9.9	1,693.9	42.6
80 to 90	402.5	1,682.6	—	1,904.0	111.0
70 to 80	230.2	1,410.4	—	1,785.8	290.5
60 to 70	125.1	1,269.0	—	1,626.2	476.3
Medium stocked	1,819.6	6,264.5	9.9	7,009.9	920.4
50 to 60	72.1	778.0	120.5	1,111.8	955.4
40 to 50	68.8	448.2	134.1	624.5	1,337.3
30 to 40	13.8	197.3	303.7	252.5	2,057.3
20 to 30	1.6	162.0	852.6	178.5	2,343.2
10 to 20	9.7	84.0	2,083.5	74.7	2,157.0
Less than 10	24.9	68.3	7,979.4	77.6	1,638.8
Poorly stocked	190.9	1,737.8	11,473.8	2,319.6	10,489.0
All classes	11,483.7	11,483.7	11,483.7	11,483.7	11,483.7

[a] Fully stocked stands are considered to contain 75 to 100 square feet of basal area per acre.

Table 6.—*Area of commercial forest land, by area condition and ownership classes, West Virginia, 1975*

(In thousands of acres)

Area-condition class[a]	All ownerships	National Forest	Other public	Forest industry	Farmer and other
Class *10*	284.6	284.6	—	—	—
Class *20*	105.3	105.3	—	—	—
Class *30*	107.1	107.1	—	—	—
Class *40*	170.4	160.5	—	9.9	—
Class *50*	1,932.1	66.8	59.0	152.3	1,654.0
Class *60*	6,644.1	91.9	104.1	487.4	5,960.7
Class *70*	2,240.1	56.4	105.1	230.1	1,848.5
All classes	11,483.7	872.6	268.2	879.7	9,463.2

[a] Class *10.*—Areas fully stocked with desirable trees and not overstocked.

Class *20.*—Areas fully stocked with desirable trees, but overstocked with all live trees.

Class *30.*—Areas medium to fully stocked with desirable trees, and with less than 30 percent of the area controlled by other trees and/or inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.

Class *40.*—Areas medium to fully stocked with desirable trees and with 30 percent or more of the area controlled by other trees and/or conditions that ordinarily prevent occupancy by desirable trees.

Class *50.*—Areas poorly stocked with desirable trees, but fully stocked with growing-stock trees.

Class *60.*—Areas poorly stocked with desirable trees, but with medium to full stocking of growing-stock trees.

Class *70.*—Areas poorly stocked with desirable trees, and poorly stocked with growing-stock trees.

Table 7.—*Area of commercial forest land, by potential site productivity and ownership classes, West Virginia, 1975*

(In thousands of acres)

Growth-per-acre class (cubic feet)	All ownerships	National Forest	Other public	Forest industry	Farmer and other
120 to 165	1,041.8	164.2	22.2	113.1	742.3
85 to 120	3,718.7	384.7	111.2	438.6	2,784.2
50 to 85	4,754.5	244.2	110.9	261.4	4,138.0
Less than 50	1,968.7	79.5	23.9	66.6	1,798.7
All classes	11,483.7	872.6	268.2	879.7	9,463.2

Table 8.—*Area of commercial forest land, by forest types and ownership classes, West Virginia, 1975*

(In thousands of acres)

Forest type	All ownerships	National Forest	Other public	Forest industry	Farmer and other
White and red pine	101.2	4.2	—	8.8	88.2
Spruce-fir	59.0	36.3	—	18.0	4.7
Virginia and pitch pine	485.2	.9	7.4	17.8	459.1
Oak-pine	568.2	86.2	9.5	8.9	463.6
Oak-hickory	6,828.1	260.0	197.1	387.7	5,983.3
Elm-ash-cottonwood	814.5	12.8	4.4	75.4	721.9
Maple-beech-birch	2,618.6	472.2	49.8	363.1	1,733.5
Aspen-birch	8.9	—	—	—	8.9
All types	11,483.7	872.6	268.2	879.7	9,463.2

Table 9.—*Area of commercial forest land, by forest types and stand-size classes, West Virginia, 1975*

(In thousands of acres)

Forest type	All stands	Saw-timber stands	Pole-timber stands	Sapling-seedling stands	Non-stocked areas
White and red pine	101.2	36.8	54.1	10.3	—
Spruce-fir	59.0	43.6	14.0	1.1	0.3
Virginia and pitch pine	485.2	163.7	173.9	147.6	
Oak-pine	568.2	221.6	172.7	164.3	9.6
Oak-hickory	6,828.1	2,794.4	2,455.5	1,465.7	112.5
Elm-ash-cottonwood	814.5	258.4	282.1	274.0	—
Maple-beech-birch	2,618.6	1,557.2	807.3	243.1	11.0
Aspen-birch	8.9	—			8.9
All types	11,483.7	5,075.7	3,959.6	2,306.1	142.3

Table 10.—*Area of commercial forest land by local forest types and major forest types, West Virginia, 1975*

(In thousands of acres)

Local forest type and major forest type	Area
White pine	37.9
Hemlock	63.3
Total, white and red pine	101.2
Red spruce-balsam fir	59.0
Total, spruce-fir	59.0
Shortleaf pine	12.2
Virginia pine	450.9
Pitch pine	22.1
Total, Virginia and pitch pine	485.2
White pine-northern red oak-white ash	27.6
Virginia pine-southern red oak	396.7
Shortleaf pine-hardwoods	36.1
Other oak-pine	107.8
Total, oak-pine	568.2
Post, black, or bear oak	349.1
Chestnut oak	1,062.2
White oak-red oak-hickory	1,594.4
White oak	706.5
Northern red oak	242.8
Yellow-poplar—white oak—no. red oak	572.8
Sweetgum—yellow-poplar	683.6
Mixed hardwoods	1,616.7
Total, oak-hickory	6,828.1
Black ash-elm-red maple	764.9
River birch-sycamore	49.6
Total, elm-ash-cottonwood	814.5
Sugar maple-beech-yellow birch	2,422.9
Black cherry	152.7
Black walnut	43.0
Total, maple-beech-birch	2,618.6
Aspen	8.9
Total, aspen-birch	8.9
All types	11,483.7

Table 11.—*Area of noncommercial forest land, by forest types, West Virginia, 1975*
(In thousands of acres)

Forest type	All areas	Productive-reserved areas	Unproductive areas
Spruce-fir	8.0	3.0	5.0
Virginia and pitch pine	17.3	11.4	5.9
Oak-pine	12.5	.9	11.6
Oak-hickory	51.8	50.8	1.0
Elm-ash-cottonwood	1.8	1.8	—
Maple-beech-birch	57.5	56.5	1.0
All types	148.9	124.4	24.5

Table 12.—*Number of trees on commercial forest land by species groups, tree classes, and diameter classes, West Virginia, 1975*
(In thousands of trees)

Dbh class (inches)	Softwoods			Hardwoods		
	Growing-stock trees	Rough and rotten trees	Total	Growing-stock trees	Rough and rotten trees	Total
Poletimber:						
5.0 to 6.9	43,729	7,798	51,527	430,797	184,178	614,975
7.0 to 8.9	33,021	3,918	36,939	264,040	71,284	335,324
9.0 to 10.9	—	—	—	167,698	34,405	202,103
Total	76,750	11,716	88,466	862,535	289,867	1,152,402
Small sawtimber:						
9.0 to 10.9	16,897	2,579	19,476	—	—	—
11.0 to 12.9	10,194	751	10,945	92,862	23,617	116,479
13.0 to 14.9	4,537	518	5,055	62,717	12,679	75,396
Total	31,628	3,848	35,476	155,579	36,296	191,875
Large Sawtimber:						
15.0 to 16.9	2,372	166	2,538	36,727	7,591	44,318
17.0 to 18.9	1,140	—	1,140	19,584	5,411	24,995
19.0 to 20.9	623	22	645	10,441	3,433	13,874
21.0 to 28.9	447	66	513	11,132	5,719	16,851
29.0 and larger	35	—	35	957	1,400	2,357
Total	4,617	254	4,871	78,841	23,554	102,395
All classes	112,995	15,818	128,813	1,096,955	349,717	1,446,672

Table 13.—*Number of growing-stock trees on commercial forest land, by species and diameter classes, West Virginia, 1975*

(In thousands of trees)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Virginia pine	64,644	27,574	19,114	10,066	5,155	1,969	599	167	—	—	—
Other yellow pines	13,185	3,461	4,586	2,701	1,384	615	345	50	43	—	—
White pine	10,314	3,532	3,841	1,087	799	307	149	222	196	151	30
Red spruce	7,692	1,081	1,613	1,557	1,479	785	713	280	123	61	—
Hemlock[a]	17,160	8,081	3,867	1,486	1,377	861	566	421	261	235	5
Total softwoods	112,995	43,729	33,021	16,897	10,194	4,537	2,372	1,140	623	447	35
Select white oaks[b]	114,106	42,150	28,320	18,223	10,893	6,712	3,753	2,006	1,129	798	122
Select red oaks[c]	75,992	22,291	15,292	13,063	7,984	5,844	4,574	2,733	1,734	2,234	243
Other white oaks[d]	125,500	47,603	29,907	19,897	10,295	7,650	3,967	2,710	1,613	1,700	158
Other red oaks[e]	104,255	36,207	24,312	15,719	8,251	8,321	4,930	2,922	1,534	1,852	207
Red maple	94,983	44,681	25,183	12,906	6,492	3,378	1,142	643	191	336	31
Sugar maple	74,313	32,023	18,101	12,886	4,893	3,059	1,592	708	331	675	45
Yellow birch	17,836	9,148	5,083	2,179	591	129	274	104	143	185	—
Sweet birch	35,209	19,207	8,503	4,530	1,401	994	264	116	148	46	—
Hickory	126,776	57,937	32,884	18,379	8,907	4,532	2,246	1,132	409	341	9
Beech	44,713	16,091	9,222	6,966	4,852	2,795	2,446	1,088	544	655	54
Ash	27,335	11,558	6,722	2,668	2,896	1,680	1,065	410	140	184	12
Black walnut	10,609	4,085	2,415	1,934	915	662	324	122	59	93	—
Yellow-poplar	103,246	33,289	23,334	16,619	11,422	8,434	5,341	2,761	1,130	878	38
Cucumbertree	10,954	3,273	3,531	1,470	1,388	565	459	158	98	12	—
Blackgum	12,508	6,995	2,529	580	714	611	337	290	194	258	—
Black cherry	28,632	8,813	5,661	4,814	3,225	3,277	1,434	693	466	249	—
Basswood	22,955	7,760	3,814	5,208	2,937	1,356	1,067	302	229	282	—
Other hardwoods	67,033	27,686	19,227	9,657	4,806	2,718	1,512	686	349	354	38
Total hardwoods	1,096,955	430,797	264,040	167,698	92,862	62,717	36,727	19,584	10,441	11,132	957
All species	1,209,950	474,526	297,061	184,595	103,056	67,254	39,099	20,724	11,064	11,579	992

[a] Includes 80 thousand redcedar trees.
[b] Includes 113,834 thousand white oaks; 36 thousand swamp white oaks; and 236 thousand chinkapin oak trees.
[c] Includes only northern red oak trees.
[d] Includes 124,831 thousand chestnut oaks and 669 thousand post oak trees.
[e] Includes 63,537 thousand black oaks; 39,739 thousand scarlet oaks; 747 thousand pin oaks; and 232 thousand willow oak trees.

Table 14.—*Net volume of timber on commercial forest land, by class of timber, softwoods and hardwoods, West Virginia, 1975*

(In millions of cubic feet)

Class of timber	All species	Softwoods	Hardwoods
Sawtimber trees:			
Sawlog portion	6,581.9	608.8	5,973.1
Upper-stem portion	1,467.2	84.4	1,382.8
All sawtimber trees	8,049.1	693.2	7,355.9
Poletimber trees	5,466.3	301.8	5,164.5
All growing-stock trees	13,515.4	995.0	12,520.4
Rough trees	1,449.6	76.1	1,373.5
Rotten trees	612.7	13.1	599.6
Total, all trees	15,577.7	1,084.2	14,493.5

Table 15.—*Net volume of growing stock and sawtimber on commercial forest land, by ownership classes, stand-size classes, softwoods and hardwoods, West Virginia 1975*

Ownership or stand-size class	Growing stock (million cubic feet)			Sawtimber (million board feet)[a]		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
			BY OWNERSHIP CLASSES			
National Forest	1,886.8	217.8	1,669.0	4,180.9	734.2	3,446.7
Other public	295.0	16.1	278.9	537.6	47.8	489.8
Forest industry	1,178.2	87.8	1,090.4	2,765.6	274.8	2,490.8
Farmer and other	10,155.4	673.3	9,482.1	20,146.7	1,542.9	18,603.8
All ownerships	13,515.4	995.0	12,520.4	27,630.8	2,599.7	25,031.1
			BY STAND-SIZE CLASSES			
Sawtimber stands	8,532.5	660.1	7,872.4	21,655.1	2,023.8	19,631.3
Poletimber stands	4,205.3	273.8	3,931.5	4,837.2	435.1	4,402.1
Sapling-seedling stands	766.2	61.1	705.1	1,116.8	140.8	976.0
Nonstocked areas	11.4	—	11.4	21.7	—	21.7
All classes	13,515.4	995.0	12,520.4	27,630.8	2,599.7	25,031.1

[a] International 1/4-inch rule.

Table 16.—*Net volume of growing stock and sawtimber on commercial forest land, by forest types, and softwoods and hardwoods, West Virginia, 1975*

Forest type	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	Million cubic feet			*Million board feet*[a]		
White and red pine	183.2	114.9	68.3	321.4	204.6	116.8
Spruce-fir	151.3	97.2	54.1	461.6	351.5	110.1
Virginia and pitch pine	430.2	277.1	153.1	809.8	595.1	214.7
Oak pine	558.5	192.8	365.7	1,174.2	502.2	672.0
Oak-hickory	7,722.1	137.3	7,584.8	15,379.5	373.5	15,006.0
Elm-ash-cottonwood	764.6	13.3	751.3	1,403.8	41.1	1,362.7
Maple-beech-birch	3,705.5	162.4	3,543.1	8,080.5	531.7	7,548.8
All types	13,515.4	995.0	12,520.4	27,630.8	2,599.7	25,031.1

[a] International 1/4-inch rule.

Table 17.—*Net volume of growing stock on commercial forest land, by species and diameter classes, West Virginia, 1975*
(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Virginia pine	416.5	55.7	99.2	100.5	86.8	47.3	20.2	6.8	—	—	—
Other yellow pines	115.1	6.4	23.4	26.9	23.5	17.1	11.7	2.8	3.3	—	—
White pine	125.5	16.4	27.3	12.4	14.0	7.5	5.3	9.8	12.4	13.5	6.9
Red spruce	153.3	4.4	13.7	19.7	30.7	25.2	29.8	15.5	8.6	5.7	—
Hemlock[a]	184.6	31.2	24.1	14.5	20.9	20.1	20.1	18.1	14.6	20.3	.7
Total softwoods	995.0	114.1	187.7	174.0	175.9	117.2	87.1	53.0	38.9	39.5	7.6
Select white oaks[b]	1,293.0	132.0	178.2	201.7	200.3	182.5	140.5	99.0	70.4	68.6	19.8
Select red oaks[c]	1,294.1	84.2	108.6	158.2	151.2	157.5	167.9	132.8	102.7	194.8	36.2
Other white oaks[d]	1,384.7	158.7	187.4	213.8	175.2	182.0	130.2	114.5	83.5	121.1	18.3
Other red oaks[e]	1,427.1	131.4	162.5	177.8	149.9	215.9	177.3	137.3	90.0	153.9	31.1
Red maple	829.9	156.1	168.5	161.7	122.8	93.6	41.7	32.8	11.6	36.6	4.5
Sugar maple	758.6	133.8	133.6	149.4	87.0	77.7	56.3	33.0	19.4	61.0	7.4
Yellow birch	142.5	34.6	35.9	24.0	9.4	3.1	8.0	4.1	7.4	16.0	—
Sweet birch	250.7	71.2	57.7	51.9	24.1	21.9	7.9	5.1	7.4	3.5	—
Hickory	1,173.8	210.5	225.8	222.4	175.8	131.2	89.9	58.7	27.5	30.7	1.3
Beech	612.3	57.2	61.4	77.7	89.3	74.6	94.2	56.7	32.6	58.6	10.0
Ash	282.2	33.8	39.4	29.1	51.3	43.5	37.6	20.7	8.6	16.0	2.2
Black walnut	107.2	11.4	14.3	20.4	15.9	16.6	11.6	6.4	3.4	7.2	—
Yellow-poplar	1,412.8	117.1	157.4	189.0	217.2	236.9	207.3	133.3	71.4	78.2	5.0
Cucumbertree	124.7	11.2	23.2	16.3	26.4	15.4	17.2	8.2	5.8	1.0	—
Blackgum	132.5	24.7	17.0	6.7	13.2	15.4	11.6	13.5	10.7	19.7	—
Black cherry	453.6	33.6	41.6	63.4	68.0	101.3	57.5	35.2	31.7	21.3	—
Basswood	207.5	13.7	18.4	45.0	39.1	22.6	19.0	13.9	11.6	24.2	—
Other hardwoods	633.2	82.0	120.1	107.8	90.4	77.3	58.7	36.0	22.1	32.6	6.2
Total hardwoods	12,520.4	1,497.2	1,751.0	1,916.3	1,706.5	1,669.0	1,334.4	941.2	617.8	945.0	142.0
All species	13,515.4	1,611.3	1,938.7	2,090.3	1,882.4	1,786.2	1,421.5	994.2	656.7	984.5	149.6

[a] Includes 1.8 million cubic feet of redcedar.
[b] Includes 1,289.9 million cubic feet of white oak; 1.0 million of swamp white oak; and 2.1 million of chinkapin oak.
[c] Includes only northern red oak.
[d] Includes 1,379.0 million cubic feet of chestnut oak and 5.7 million of post oak.
[e] Includes 915.5 million cubic feet of black oak; 499.3 million of scarlet oak; 10.6 million of pin oak, 1.7 million of willow oak.

Table 18.—*Net volume of sawtimber on commercial forest land, by species and diameter classes, West Virginia, 1975*

(In millions of board feet)[a]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Virginia pine	903.2	304.2	302.3	183.6	83.8	29.3	—	—	—
Other yellow pines	300.2	82.5	81.7	66.3	47.2	10.1	12.4	—	—
White pine	328.8	39.8	50.4	29.3	23.3	43.5	59.8	65.4	17.3
Red spruce	565.2	63.9	119.8	106.5	128.9	73.5	44.4	28.2	—
Hemlock[b]	502.3	44.9	77.5	78.5	71.0	76.3	63.8	87.4	2.9
Total softwoods	2,599.7	535.3	631.7	464.2	354.2	232.7	180.4	181.0	20.2
Select white oaks[c]	2,668.1	—	615.3	611.4	493.5	359.1	260.3	256.9	71.6
Select red oaks[d]	3,203.8	—	438.4	517.9	581.3	468.0	367.8	710.1	120.3
Other white oaks[e]	2,768.6	—	513.7	593.0	442.9	400.4	305.3	444.0	69.3
Other red oaks[f]	3,354.4	—	455.5	732.5	631.0	503.8	334.4	581.8	115.4
Red maple	1,085.9	—	344.1	297.4	140.5	113.8	42.6	130.0	17.5
Sugar maple	1,158.0	—	263.4	255.9	193.9	117.7	72.5	226.5	28.1
Yellow birch	164.8	—	25.1	10.5	31.0	15.0	31.2	52.0	—
Sweet birch	228.2	—	71.4	69.4	25.5	17.5	30.4	14.0	—
Hickory	1,720.6	—	527.7	435.7	317.7	215.2	102.2	117.5	4.6
Beech	1,459.3	—	256.1	247.3	337.4	219.3	130.0	228.9	40.3
Ash	591.0	—	150.7	141.4	129.6	69.2	30.0	60.4	9.7
Black walnut	206.8	—	47.9	55.4	40.7	23.6	12.5	26.7	—
Yellow-poplar	3,267.7	—	651.9	784.1	749.6	496.0	270.9	296.0	19.2
Cucumbertree	247.3	—	79.4	49.6	61.4	30.2	22.9	3.8	—
Blackgum	296.1	—	40.0	51.0	41.0	49.3	38.6	76.2	—
Black cherry	1,112.1	—	203.0	353.7	214.0	131.7	128.5	81.2	—
Basswood	417.5	—	108.7	73.3	64.3	48.4	40.4	82.4	—
Other hardwoods	1,080.9	—	268.7	251.7	207.5	126.1	86.0	119.2	21.7
Total hardwoods	25,031.1	—	5,061.0	5,531.2	4,702.8	3,404.3	2,306.5	3,507.6	517.7
All species	27,630.8	535.3	5,692.7	5,995.4	5,057.0	3,637.0	2,486.9	3,688.6	537.9

[a] International 1/4-inch rule.
[b] Includes 6.6 million board feet of redcedar.
[c] Includes 2,662.0 million board feet of white oak; 3.4 million of swamp white oak; and 2.7 million of chinkapin oak.
[d] Includes only northern red oak.
[e] Includes 2,761.0 million board feet of chestnut oak and 7.6 million of post oak.
[f] Includes 2,221.1 million board feet of black oak; 1,102.4 million of scarlet oak; and 30.9 million of pin oak.

Table 19.—*Net volume of sawtimber on commercial forest land, by species and quality classes, West Virginia, 1975*
(In millions of board feet)[a]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[b]
Softwoods:					
White pine	328.8	22.1	68.7	185.0	53.0
Virginia pine	903.2	16.5	27.1	859.6	—
Other yellow pines	300.2	18.2	21.7	260.3	—
Other softwoods[c]	1,067.5	—	—	—	—
Total softwoods	2,599.7	56.8	117.5	1,304.9	53.0
Hardwoods:					
Select white oaks	2,668.1	182.0	431.1	1,370.6	684.4
Select red oaks	3,203.8	742.4	706.0	1,341.3	414.1
Other white oaks	2,768.6	297.3	518.6	1,289.8	662.9
Other red oaks	3,354.4	495.4	533.1	1,434.1	891.8
Red maple	1,085.9	123.6	145.7	545.8	270.8
Sugar maple	1,158.0	144.3	187.9	545.2	280.6
Yellow birch	164.8	25.5	28.6	76.5	34.2
Sweet birch	228.2	26.6	44.7	114.5	42.4
Hickory	1,720.6	161.0	237.3	799.2	523.1
Beech	1,459.3	120.7	193.2	691.3	454.1
Ash	591.0	79.2	137.7	261.4	112.7
Black walnut	206.8	5.2	27.5	131.4	42.7
Yellow-poplar	3,267.7	658.8	600.0	1,337.3	671.6
Cucumbertree	247.3	23.2	47.5	125.0	51.6
Blackgum	296.1	54.7	76.7	125.9	38.8
Black cherry	1,112.1	169.7	218.9	483.8	239.7
Basswood	417.5	57.1	95.7	203.3	61.4
Other hardwoods	1,080.9	65.8	149.8	619.6	245.7
Total hardwoods	25,031.1	3,432.5	4,380.0	11,496.0	5,722.6
			Percent		
Hardwood quality	100	14	17	46	23

[a] International 1/4-inch rule.
[b] Grade 4 applies only to white pine. For hardwoods the volumes in this column are for construction logs.
[c] Species other than pine are not graded into standard-lumber grades.

Table 20.—*Components of average annual change of growing stock and sawtimber on commercial forest land, West Virginia 1960-74*

Components	Growing stock	Sawtimber
	Thousand cubic feet	*Thousand board feet*[b]
Growth on initial inventory[a]	232,800	372,000
Ingrowth—trees entering the volume class	178,100	448,100
Gross growth	410,900	820,100
Cull increment	−53,900	−80,300
Annual mortality	−49,200	−76,200
Average annual net growth	307,800	663,600
Average annual removals	−119,300	−257,000
Average annual change	188,500	406,600

[a] Including growth on trees that were subsequently cut.
[b] International 1/4-inch rule.

Table 21.—*Current annual net growth, removals, and mortality of growing stock and sawtimber on commercial forest land, by species, West Virginia, 1974*[a]

Species	Growing stock			Sawtimber		
	Annual net growth	Annual timber removals	Annual mortality	Annual net growth	Annual timber removals	Annual mortality
	Thousand cubic feet			*Thousand board feet* [b]		
Softwoods:						
Virginia pine	31,400	3,000	3,500	96,800	3,500	8,400
White pine	10,400	—	700	33,600	—	—
Other softwoods	16,800	7,600	4,400	41,600	24,300	6,100
Total	58,600	10,600	8,600	172,000	27,800	14,500
Hardwoods:						
Select white oaks	46,300	17,400	4,700	75,000	45,100	10,200
Select red oaks	54,700	19,400	4,200	108,300	51,300	5,900
Other white oaks	27,100	10,100	8,100	42,500	26,000	19,600
Other red oaks	33,000	18,100	7,800	61,200	48,300	17,900
Maples	73,300	12,900	2,700	79,800	33,000	2,800
Hickory	18,400	11,800	7,000	21,500	30,400	10,800
Beech	12,600	19,800	1,900	21,700	51,700	4,700
Ash, black cherry & walnut	39,700	3,500	4,200	62,100	8,800	2,900
Yellow-poplar	78,100	27,600	2,100	138,700	72,600	3,000
Other hardwoods	31,700	14,900	12,800	40,200	38,100	6,800
Total hardwoods	414,900	155,500	55,500	651,000	405,300	84,600
Total, all species	473,500	166,100	64,100	823,000	433,100	99,100

[a] Based on the trend between inventories.
[b] International 1/4-inch log rule.

Table 22.—*Current annual net growth and removals of growing stock and sawtimber on commercial forest land, by ownership classes, softwoods and hardwoods, West Virginia, 1974*

Ownership	Annual net growth			Annual timber removals		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
			GROWING STOCK			
			Thousand cubic feet			
National Forest	59,100	4,600	54,500	14,900	800	14,100
Other public	10,000	1,000	9,000	—	—	—
Forest industry	39,900	6,600	33,300	19,900	4,200	15,700
Farmer and other	364,500	46,400	318,100	131,300	5,600	125,700
All ownerships	473,500	58,600	414,900	166,100	10,600	155,500
			SAWTIMBER			
			Thousand board feet [a]			
National Forest	127,000	19,400	107,600	44,800	2,300	42,500
Other public	16,900	4,400	12,500	—	—	—
Forest industry	77,900	23,400	54,500	68,300	15,800	52,500
Farmer and other	601,200	124,800	476,400	320,000	9,700	310,300
All ownerships	823,000	172,000	651,000	433,100	27,800	405,300

[a] International 1/4-inch rule.

Table 23.—*Current annual mortality of growing stock and sawtimber on commercial forest land, softwoods and hardwoods, West Virginia 1974*

Ownership and cause	Growing stock (thousand cubic feet)			Sawtimber (thousand board feet)[a]		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
			BY OWNERSHIP			
National Forest	6,400	800	5,600	11,800	2,500	9,300
Other public	1,400	200	1,200	1,800	300	1,500
Forest industry	5,700	900	4,800	10,800	1,900	8,900
Farmer and other	50,600	6,700	43,900	74,700	9,800	64,900
All ownerships	64,100	8,600	55,500	99,100	14,500	84,600
			BY CAUSE			
Fire	1,900	—	1,900	5,100	—	5,100
Insects	600	100	500	400	400	—
Disease	14,400	1,900	12,500	20,900	1,300	19,600
Weather	3,700	100	3,600	9,200	—	9,200
Other	3,600	500	3,100	5,400	500	4,900
Unknown	39,900	6,000	33,900	58,100	12,300	45,800
All causes	64,100	8,600	55,500	99,100	14,500	84,600

[a] International 1/4-inch rule.

Table 24.—*Sampling errors for major forest area and timber-volume classes, West Virginia, 1975*

(In percent)

Table no.	Item classification	Sampling error
	FOREST AREA	
1	Forest-land area:	
	Commercial	1.0
	Unproductive	35.0
	Total	1.0
2	Ownership:[a]	
	Forest industry	10
	Farmer-owned	8
	Misc. private	2
	Farmer and other	2
3	Stand-size class:	
	Sawtimber	3
	Poletimber	4
	Sapling-seedling	6
	Nonstocked areas	28
4	Stand-volume per acre (board feet):	
	Less than 1,500	4
	1,500 to 5,000	3
	More than 5,000	6
6	Area-condition class:	
	10-40	*
	50	7
	60	3
	70	6
7	Growth-per-acre class (cubic feet):	
	120 to 165	11
	85 to 120	5
	50 to 85	4
	Less than 50	6
8	Forest type:	
	White-red pine	32
	Spruce-fir	*
	Virginia and pitch pine	12
	Oak-pine	13
	Oak-hickory	3
	Elm-ash-cottonwood	11
	Maple-beech-birch	6
	Aspen-birch	*

Table no.	Item classification	Sampling error	
	TIMBER VOLUME	*Growing stock*	*Sawtimber*
14	Class of timber:		
	Sawtimber trees	2	—
	Poletimber trees	2	—
	All growing stock	2	—
	Rough trees	4	—
	Rotten trees	4	—
	All live trees	2	—
15	Ownership and stand-size:		
	National Forest	5	8
	Other public	20	24
	Forest industry	11	13
	Farm and other	2	3
	Sawtimber stands	4	4
	Poletimber stands	5	6
	Sapling-seedling	7	10
	Nonstocked areas	43	*
16	Forest type:		
	White and red pine	35	37
	Spruce-fir	*	*
	Virginia and pitch pine	13	18
	Oak-pine	17	19
	Oak-hickory	3	4
	Elm-ash-cottonwood	13	15
	Maple-beech-birch	7	8
17-18	Diameter classes (inches):		
	5.0-6.9	3	—
	7.0-8.9	3	—
	9.0-10.9[b]	3	12
	11.0-12.9	3	3
	13.0-14.9	3	3
	15.0-16.9	4	4
	17.0-18.9	4	5
	19.0-20.9	5	6
	21.0-28.9	5	6
	29.0 and larger	12	13
17-18	Species:		
	White pine	30	24
	Virginia pine	9	12
	Pitch pine	19	20
	Other yellow pines	26	26
	Red spruce	31	29
	Hemlock	20	20
	Select white oaks	6	2
	Select red oaks	6	7
	Other white oaks	6	7
	Other red oaks	5	6
	Red maple	6	9
	Sugar maple	8	10
	Yellow birch	14	23
	Sweet birch	11	15
	Hickory	5	8
	Beech	9	11
	Ash	10	12
	Black walnut	13	19
	Yellow-poplar	6	8
	Cucumbertree	11	16
	Blackgum	12	16

Continued

Table 24.—Continued

Table no.	Item classification	Sampling error	
		Growing stock	*Sawtimber*
	Black cherry	11	14
	Basswood	17	20
	Other hardwoods	7	11
	All softwoods	8	9
	All hardwoods	2	3
	All species	1.7	2.4
22	Growth by:		
	National Forest	15	11
	Other public	*	**
	Forest industry	26	31
	Farm and other	11	12
	Softwoods	46	40
	Hardwoods	8	11
	All species	8	11
22	Removals by:		
	National Forest	10	27
	Other public	—	—
	Forest industry	*	*
	Farmer and other	16	19
	Softwoods	*	*
	Hardwoods	15	18
	All species	15	19
	MORTALITY		
23	By ownership:		
	National Forest	15	22
	Other public	*	*
	Forest industry	41	*
	Farmer and other	11	20
	Softwoods	36	*
	Hardwoods	9	19
	All species	9	19
23	By cause:		
	Fire	*	*
	Insect	*	*
	Disease	19	34
	Weather	37	*
	Suppression	48	*
	Unknown	13	26

*Sampling errors of 50 to 99 percent.

** Sampling errors of over 100 percent.

[a] Some classifications have no sampling errors and some less important classifications have been omitted.

[b] Board-foot sampling error for this class is for softwoods only.

Table 25.—*Output of timber products, by source of material, softwoods and hardwoods, West Virginia, 1974*

Product and species group	Standard units	Total output		Output from roundwood		Output from plant byproducts	
		Number of units	Thousand cubic feet	Number of units	Thousand cubic feet	Number of units	Thousand cubic feet
Sawlogs:							
Softwood	M bd ft[a]	17,276	2,887	17,276	2,887	—	—
Hardwood	M bd ft	446,421	69,355	446,421	69,355	—	—
Total	M bd ft	463,697	72,242	463,697	72,242	—	—
Veneer logs and bolts:							
Softwood	M bd ft	—	—	—	—	—	—
Hardwood	M bd ft	3,163	491	3,163	491	—	—
Total	M bd ft	3,163	491	3,163	491	—	—
Pulpwood:							
Softwood	Std cords[b]	54,500	4,632	50,800	4,318	3,700	314
Hardwood	Std cords	357,600	30,396	162,800	13,838	194,800	16,558
Total	Std cords	412,100	35,028	213,600	18,156	198,500	16,872
Cooperage logs and bolts:							
Softwood	M bd ft	—	—	—	—	—	—
Hardwood	M bd ft	3,167	492	3,167	492	—	—
Total	M bd ft	3,167	492	3,167	492	—	—
Poles:							
Softwood	M pieces	1	12	1	12	—	—
Hardwood	M pieces	—	—	—	—	—	—
Total	M pieces	1	12	1	12	—	—

Posts (round and split):							
Softwood	M pieces	96	190	96	190	—	—
Hardwood	M pieces	1,382	1,943	1,382	1,943	—	—
Total	M pieces	1,478	2,133	1,478	2,133	—	—
Mine timbers (round):							
Softwood	M ft^3	550	550	550	550	—	—
Hardwood	M ft^3	6,192	6,192	6,192	6,192	—	—
Total	M ft^3	6,742	6,742	6,742	6,742	—	—
Other:[c]							
Softwood	M ft^3	4,578	4,578	3,682	3,682	896	896
Hardwood	M ft^3	7,047	7,047	2,661	2,661	4,386	4,386
Total	M ft^3	11,625	11,625	6,343	6,343	5,282	5,282
Total industrial products:							
Softwood	M ft^3		12,849		11,639		1,210
Hardwood	M ft^3		115,916		94,972		20,944
Total	M ft^3		128,765		106,611		22,154
Fuelwood:							
Softwood	Std cords[d]	5,548	444	1,786	143	3,762	301
Hardwood	Std cords	87,218	6,977	36,268	2,901	50,950	4,076
Total	Std cords	92,766	7,421	38,054	3,044	54,712	4,377
All products:[e]							
Softwood	M ft^3		13,293		11,782		1,511
Hardwood	M ft^3		122,893		97,873		25,020
Total	M ft^3		136,186		109,655		26,531

[a] International 1/4-inch rule.
[b] Rough wood basis, includes chips converted to equivalent standard cords, 85 ft^3 of solid wood.
[c] Includes metallurgical chips, charcoal wood, handle stock, dimension, and fence rails.
[d] Rough wood basis, includes chips converted to equivalent standard cords, 80 ft^3 of solid wood.
[e] Does not include 63,000 cubic feet of softwood and 777,000 cubic feet of hardwood residues used for agricultural bedding.

Table 26.—*Output of roundwood products, by source, softwoods and hardwoods, West Virginia, 1974*
(In thousands of cubic feet)

Product and species group	All sources	Growing-stock trees[a]			Rough and rotten trees[a]	Salvable dead trees[a]	Other sources[b]
		Total	Sawtimber	Poletimber			
			PRINCIPAL INDUSTRIAL PRODUCTS				
Sawlogs:							
Softwood	2,887	2,548	2,548	—	—	178	161
Hardwood	69,355	66,505	64,790	1,715	21	1,120	1,709
Total	72,242	69,053	67,338	1,715	21	1,298	1,870
Veneer logs and bolts:							
Softwood	—	—	—	—	—	—	—
Hardwood	491	491	486	5	—	—	—
Total	491	491	486	5	—	—	—
Pulpwood:							
Softwood	4,318	3,242	1,889	1,353	—	648	428
Hardwood	13,838	12,555	5,249	7,306	—	325	958
Total	18,156	15,797	7,138	8,659	—	973	1,386
			MISCELLANEOUS INDUSTRIAL PRODUCTS				
Cooperage logs and bolts:							
Softwood	—	—	—	—	—	—	—
Hardwood	492	492	487	5	—	—	—
Total	492	492	487	5	—	—	—
Piling:							
Softwood	—	—	—	—	—	—	—
Hardwood	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—
Poles:							
Softwood	12	11	9	2	—	—	1
Hardwood	—	—	—	—	—	—	—
Total	12	11	9	2	—	—	1

Posts (round and split):							
Softwood	190	86	63	23	—	99	5
Hardwood	1,943	1,278	409	869	646	—	19
Total	2,133	1,364	472	892	646	99	24
Mine timbers (round):							
Softwood	550	550	434	116	—	—	—
Hardwood	6,192	6,068	3,459	2,609	37	56	31
Total	6,742	6,618	3,893	2,725	37	56	31
Other:							
Softwood	3,682	1,676	1,224	452	—	1,905	101
Hardwood	2,661	2,414	1,009	1,405	—	63	184
Total	6,343	4,090	2,233	1,857	—	1,968	285
TOTAL INDUSTRIAL PRODUCTS							
Softwood	11,639	8,113	6,167	1,946	—	2,830	696
Hardwood	94,972	89,803	75,889	13,914	704	1,564	2,901
Total	106,611	97,916	82,056	15,860	704	4,394	3,597
NONINDUSTRIAL PRODUCTS							
Fuelwood:							
Softwood	143	72	52	20	—	13	58
Hardwood	2,901	1,471	732	739	446	412	572
Total	3,044	1,543	784	759	446	425	630
ALL PRODUCTS							
Softwood	11,782	8,185	6,219	1,966	—	2,843	754
Hardwood	97,873	91,274	76,621	14,653	1,150	1,976	3,473
Total	109,655	99,459	82,840	16,619	1,150	4,819	4,227

[a] On commercial forest land.

[b] Includes trees less than 5.0 inches in diameter, tree tops and limbs from commercial forest areas, or any material from noncommercial forest land or nonforest land such as fence rows and suburban areas.

Table 27.—*Timber removals from growing stock and sawtimber on commercial forest land, by items, softwoods and hardwoods, West Virginia, 1974*

Item	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	Thousand cubic feet			*Thousand board feet*[a]		
Roundwood products:						
Sawlogs	69,053	2,548	66,505	312,626	11,706	300,920
Veneer logs and bolts	491	—	491	2,717	—	2,717
Pulpwood	15,797	3,242	12,555	20,528	6,148	14,380
Cooperage logs and bolts	492	—	492	2,723	—	2,723
Piling	—	—	—	—	—	—
Poles	11	11	—	37	37	—
Posts	1,364	86	1,278	2,170	259	1,911
Mine timbers	6,618	550	6,068	17,918	1,760	16,158
Other	4,090	1,676	2,414	9,740	5,026	4,714
Fuelwood	1,543	72	1,471	2,174	169	2,005
All products	99,459	8,185	91,274	370,633	25,105	345,528
Logging residues	40,873	1,505	39,368	27,901	1,550	26,351
Other removals	25,775	914	24,861	34,527	1,138	33,389
Total removals	166,107	10,604	155,503	433,061	27,793	405,268

[a] International 1/4-inch rule.

Table 28.—*Volume of unused residues at primary manufacturing plants, by industry and type of residue, and softwoods and hardwoods, West Virginia, 1974*

(In thousands of cubic feet)

Species group and type of residue	All industries	Lumber	Veneer and plywood	Other
Softwoods:				
Coarse[a]	118	113	—	5
Fine[b]	270	267	—	3
Total	388	380	—	8
Hardwoods:				
Coarse[a]	3,765	3,584	12	169
Fine[b]	4,534	4,480	5	49
Total	8,299	8,064	17	218
All species:				
Coarse[a]	3,883	3,697	12	174
Fine[b]	4,804	4,747	5	52
Total	8,687	8,444	17	226

[a] Material such as slabs, edgings, and veneer cores.
[b] Material such as sawdust and shavings.

Table 29.—*Projection of annual net growth, timber removals, and inventory of growing stock and sawtimber on commercial forest land in West Virginia, 1975-2005*[a]

Species group	1975 (inventory year)	1985	1995	2005
		GROWING STOCK		
		Million cubic feet		
Softwoods:				
Removals	10.6	40.5	69.9	80.9
Growth	58.6	69.3	78.2	80.8
Inventory	995.0	1,322.0	1,530.6	1,594.1
Hardwoods:				
Removals	155.5	295.4	375.8	436.8
Growth	414.9	395.7	426.4	437.8
Inventory	12,520.4	13,907.0	14,636.2	14,869.4
Total:				
Removals	166.1	335.9	445.7	517.7
Growth	473.5	465.0	504.6	518.6
Inventory	13,515.4	15,229.0	16,166.8	16,463.5
		SAWTIMBER		
		Million board feet[b]		
Softwoods:				
Removals	27.8	143.0	230.0	294.0
Growth	172.0	235.0	272.0	284.0
Inventory	2,599.7	3,744.0	4,391.0	4,529.0
Hardwoods:				
Removals	405.3	605.0	759.0	882.0
Growth	651.0	756.0	805.0	830.0
Inventory	25,031.1	27,213.0	28,136.0	28,053.0
Total:				
Removals	433.1	748.0	989.0	1,176.0
Growth	823.0	991.0	1,077.0	1,114.0
Inventory	27,630.8	30,957.0	32,527.0	32,582.0

[a] Based upon the following assumptions: (1) the area of commercial forest will increase at a constant rate of 0.25 percent per year; and (2) total growing-stock growth and removals will be in balance at 3.1 percent of the inventory at the end of 30 years.

[b] International 1/4-inch rule.

Table 30.—*Projection of annual net growth, timber removals, and inventory of growing stock and sawtimber on commercial forest land in West Virginia, 1975-2005*[a]

Species group	1975 (inventory year)	1985	1995	2005
		GROWING STOCK		
		Million cubic feet		
Softwoods:				
Removals	10.6	15.8	23.1	32.0
Growth	58.6	77.8	100.5	120.0
Inventory	995.0	1,541.9	2,249.2	3,087.3
Hardwoods:				
Removals	155.5	187.0	229.6	281.8
Growth	414.9	499.0	612.6	752.0
Inventory	12,520.4	15,370.1	18,868.4	23,162.9
Total:				
Removals	166.1	202.8	252.7	313.8
Growth	473.5	576.8	713.1	872.0
Inventory	13,515.4	16,912.0	21,117.6	26,250.2
		SAWTIMBER		
		Million board feet[b]		
Softwoods:				
Removals	27.8	53.3	83.5	123.5
Growth	172.0	250.8	349.4	442.4
Inventory	2,599.7	4,390.0	6,826.6	9,921.6
Hardwoods:				
Removals	405.3	360.0	416.9	489.7
Growth	651.0	718.1	829.0	984.0
Inventory	25,031.1	26,392.0	30,193.6	34,764.0
Total:				
Removals	433.1	413.3	500.4	613.2
Growth	823.0	968.9	1,178.4	1,426.4
Inventory	27,630.8	30,782.0	37,020.2	44,685.6

[a] Based upon the following assumptions: (1) total area of commercial forest land will increase approximately 300,000 acres in each decade; (2) growth rates based upon the average annual net growth between 1959 and 1974 will hold for the next 30 years; (3) there will be no major increase in the level of forest management or timber utilization during the next 30 years.

[b] International 1/4-inch rule.

Table 31.—*Land area of West Virginia, by land classes and geographic units, 1975*

(In thousands of acres)

Land class	Northeastern	Southern	Northwestern	Total
Commercial	4,405.2	3,913.2	3,165.3	11,483.7
Productive-reserved	86.9	20.6	8.0	115.5
Christmas tree plantation	8.9	—	—	8.9
Unproductive	23.5	1.0	—	24.5
Total forest land	4,524.5	3,934.8	3,173.3	11,632.6
Nonforest land	1,412.6	1,089.4	1,279.2	3,781.2
All land	5,937.1	5,024.2	4,452.5	15,413.8

Table 32.—*Area of commercial forest land in West Virginia, by ownership classes and geographic units, 1975*
(In thousands of acres)

Ownership classes	Northeastern	Southern	Northwestern	Total
National Forest	733.8	138.8	—	872.6
Other federal	14.0	3.1	22.0	39.1
State	88.1	78.7	62.1	228.9
County and municipal	.2	—	—	.2
Total public	836.1	220.6	84.1	1,140.8
Forest industry	234.5	491.5	153.7	879.7
Farmer-owned	876.0	391.5	660.1	1,927.6
Miscellaneous private:				
Individual	1,634.4	1,289.6	1,863.8	4,787.8
Corporate	402.8	1,254.1	95.4	1,752.3
Other	421.4	265.9	308.2	995.5
Total private	3,569.1	3,692.6	3,081.2	10,342.9
All ownerships	4,405.2	3,913.2	3,165.3	11,483.7

Table 33.—*Area of commercial forest land in West Virginia, by stand-size classes and geographic units, 1975*
(In thousands of acres)

Stand-size class	Northeastern	Southern	Northwestern	Total
Sawtimber stands	1,785.9	1,923.9	1,365.9	5,075.7
Poletimber stands	1,682.2	1,280.4	997.0	3,959.6
Sapling-seedling stands	852.4	662.0	791.7	2,306.1
Nonstocked areas	84.7	46.9	10.7	142.3
All classes	4,405.2	3.913.2	3,165.3	11,483.7

Table 34.—*Area of commercial forest in West Virginia, by forest types and geographic units, 1975*
(In thousands of acres)

Forest type	Northeastern	Southern	Northwestern	Total
White and red pine	31.3	69.9	—	101.2
Spruce-fir	58.5	.5	—	59.0
Virginia and pitch pine	187.5	48.2	249.5	485.2
Oak-pine	264.5	93.2	210.5	568.2
Oak-hickory	2,337.0	2,506.0	1,985.1	6,828.1
Elm-ash-cottonwood	392.2	156.6	265.7	814.5
Maple-beech-birch	1,125.3	1,038.8	454.5	2,618.6
Aspen-birch	8.9	—	—	8.9
All types	4,405.2	3,913.2	3,165.3	11,483.7

Table 35.—*Number of growing-stock trees and rough and rotton trees on commercial forest land in West Virginia, by diameter-class groups, softwoods and hardwoods, and geographic units, 1975*

(In thousands of trees)

Diameter-class group (in inches)	Northeastern	Southern	Northwestern	Total
	GROWING STOCK TREES			
Softwoods:				
5.0 to 8.9	32,187	17,172	27,391	76,750
9.0 to 18.9	14,807	6,369	13,964	35,140
19.0 and larger	668	404	33	1,105
Total	47,662	23,945	41,388	112,995
Hardwoods:				
5.0 to 10.9	331,949	300,076	230,510	862,535
11.0 to 18.9	84,056	74,831	53,003	211,890
19.0 and larger	7,821	8,828	5,881	22,530
Total	423,826	383,735	289,394	1,096,955
All species	471,488	407,680	330,782	1,209,950
	ROUGH AND ROTTEN TREES			
Softwoods:				
5.0 to 8.9	6,281	4,269	1,166	11,716
9.0 to 18.9	1,590	1,855	569	4,014
19.0 and larger	50	38	—	88
Total	7,921	6,162	1,735	15,818
Hardwoods:				
5.0 to 10.9	119,504	112,743	57,620	289,867
11.0 to 18.9	22,808	18,907	7,583	49,298
19.0 and larger	4,064	4,762	1,726	10,552
Total	146,376	136,412	66,929	349,717
All species	154,297	142,574	68,664	365,535

Table 36.—*Number of growing-stock trees on commercial forest land, by species and diameter classes, Northeastern Unit, West Virginia, 1975*

(In thousands of trees)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Virginia pine	18,672	9,200	5,849	2,029	1,123	296	125	50	—	—	—
Other yellow pines	8,786	1,962	3,530	1,835	811	499	106	21	22	—	—
White pine	5,193	1,413	2,137	722	353	186	55	102	112	83	30
Red spruce	7,087	1,017	1,518	1,432	1,371	685	654	244	110	56	—
Hemlock[a]	7,924	3,707	1,854	684	554	401	247	222	149	101	5
Total softwoods	47,662	17,299	14,888	6,702	4,212	2,067	1,187	639	393	240	35
Select white oaks[b]	30,698	11,050	7,048	4,970	3,474	2,102	1,029	488	300	197	40
Select red oaks[c]	39,098	13,023	7,443	6,488	4,233	2,672	2,088	1,313	806	928	104
Other white oaks[d]	58,249	21,097	13,717	10,642	5,135	3,570	1,661	1,258	545	569	55
Other red oaks[e]	30,971	12,585	8,270	4,307	2,020	1,549	1,072	529	243	337	59
Red maple	50,421	21,237	14,325	6,981	4,910	1,830	561	315	77	176	9
Sugar maple	32,494	13,428	8,311	5,798	2,271	1,282	807	268	62	261	6
Yellow birch	12,720	6,431	3,721	1,603	343	83	218	51	122	148	—
Sweet birch	18,863	10,022	4,479	2,320	884	786	252	55	65	—	—
Hickory	34,206	12,402	10,147	6,283	3,142	1,231	519	257	91	125	9
Beech	18,292	6,120	3,958	2,996	2,133	1,213	892	527	195	258	—
Ash	8,857	3,264	2,405	1,012	899	575	397	200	60	45	—
Black walnut	2,151	633	860	263	49	221	98	—	—	27	—
Yellow-poplar	33,303	10,525	7,570	5,411	3,461	2,824	1,972	818	365	341	16
Cucumbertree	2,804	1,168	619	329	343	163	132	27	11	12	—
Blackgum	5,352	3,088	1,241	215	376	95	109	77	112	39	—
Black cherry	19,068	5,154	3,703	3,576	2,250	2,333	1,026	528	355	143	—
Basswood	6,477	1,285	1,441	1,740	940	451	260	113	106	141	—
Other hardwoods	19,802	6,878	4,571	3,796	1,961	1,358	666	311	65	172	24
Total hardwoods	423,826	159,390	103,829	68,730	38,824	24,338	13,759	7,135	3,580	3,919	322
All species	471,488	176,689	118,717	75,432	43,036	26,405	14,946	7,774	3,973	4,159	357

[a] Includes 20 thousand redcedar trees.
[b] Includes 30,588 thousand white oaks and 110 thousand chinkapin oak trees.
[c] Includes only northern red oak trees.
[d] Includes 58,057 thousand chestnut oaks and 192 thousand post oak trees.
[e] Includes 17,004 thousand black oaks; 13,812 thousand scarlet oaks, and 155 thousand willow oak trees.

Table 37.—Number of growing-stock trees on commercial forest land, by species and diameter classes, Southern Unit, West Virginia, 1975

(In thousands of trees)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Virginia pine	7,097	3,666	1,895	937	394	128	53	24	—	—	—
Other yellow pines	1,979	668	574	325	266	—	121	4	21	—	—
White pines	5,088	2,119	1,704	365	446	121	94	120	68	51	—
Red spruce	605	64	95	125	108	100	59	36	13	5	—
Hemlock	9,176	4,374	2,013	802	763	460	319	199	112	134	—
Total softwoods	23,945	10,891	6,281	2,554	1,977	809	646	383	214	190	—
Select white oaks[a]	37,795	15,291	9,110	5,181	3,397	1,923	1,384	794	377	309	29
Select red oaks[b]	25,304	5,667	5,941	4,743	2,665	2,261	1,678	929	617	737	56
Other white oaks[c]	44,439	20,605	9,738	5,163	2,853	2,322	1,355	933	657	738	75
Other red oaks[d]	43,700	15,216	9,867	6,615	3,346	3,801	1,897	1,195	808	884	71
Red maple	29,257	13,673	8,178	4,143	1,178	1,208	378	263	66	148	22
Sugar maple	22,279	10,441	5,827	3,070	1,168	824	300	211	177	229	32
Yellow birch	5,116	2,717	1,362	576	248	46	56	53	21	37	—
Sweet birch	14,460	8,211	3,262	2,060	517	208	12	61	83	46	—
Hickory	41,995	16,682	10,824	6,504	3,799	1,899	1,218	664	229	176	—
Beech	18,440	7,879	3,521	2,466	1,866	1,098	892	264	174	232	48
Ash	6,306	2,807	718	796	938	651	252	74	4	54	12
Black walnut	2,031	695	268	600	197	35	102	78	19	37	—
Yellow-poplar	43,850	13,366	9,450	7,415	5,131	3,931	2,355	1,258	555	382	7
Cucumbertree	6,832	1,903	2,428	909	773	362	301	87	69	—	—
Blackgum	4,447	2,396	819	299	93	317	166	128	63	166	—
Black cherry	5,249	2,433	825	612	502	450	240	75	56	56	—
Basswood	13,043	5,498	1,914	2,498	1,375	744	777	71	84	82	—
Other hardwoods	19,192	7,944	6,324	2,616	1,088	678	329	109	11	93	—
Total hardwoods	383,735	153,434	90,376	56,266	31,134	22,758	13,692	7,247	4,070	4,406	352
All species	407,680	164,325	96,657	58,820	33,111	23,567	14,338	7,630	4,284	4,596	352

[a] Includes only white oak trees.
[b] Includes only northern red oak trees.
[c] Includes only chestnut oak trees.
[d] Includes 27,141 thousand black oaks; 15,812 thousand scarlet oaks, and 747 thousand pin oak trees.

Table 38.—*Number of growing-stock trees on commercial forest land, by species and diameter classes, Northwestern Unit, West Virginia, 1975*

(In thousands of trees)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 +
Virginia pine	38,875	14,708	11,370	7,100	3,638	1,545	421	93	—	—	—
Other yellow pines	2,420	831	482	541	307	116	118	25	—	—	—
White pine	33	—	—	—	—	—	—	—	16	17	—
Redcedar	60	—	—	—	60	—	—	—	—	—	—
Total softwoods	41,388	15,539	11,852	7,641	4,005	1,661	539	118	16	17	—
Select white oaks[a]	45,613	15,809	12,162	8,072	4,022	2,687	1,340	724	452	292	53
Select red oaks[b]	11,590	3,591	1,908	1,832	1,086	911	808	491	311	569	83
Other white oaks[c]	22,812	5,901	6,452	4,092	2,307	1,758	951	519	411	393	28
Other red oaks[d]	29,584	8,406	6,175	4,797	2,885	2,971	1,961	1,198	483	631	77
Red maple	15,305	9,771	2,680	1,782	404	340	203	65	48	12	—
Sugar maple	19,540	8,154	3,963	4,018	1,454	953	485	229	92	185	7
Sweet birch	1,886	974	762	150	—	—	—	—	—	—	—
Hickory	50,575	28,853	11,913	5,592	1,966	1,402	509	211	89	40	—
Beech	7,981	2,092	1,743	1,504	853	484	662	297	175	165	6
Ash	12,172	5,487	3,599	860	1,059	454	416	136	76	85	—
Black walnut	6,427	2,757	1,287	1,071	669	406	124	44	40	29	—
Yellow-poplar	26,093	9,398	6,314	3,793	2,830	1,679	1,014	685	210	155	15
Cucumbertree	1,318	202	484	232	272	40	26	44	18	—	—
Black gum	2,709	1,511	469	66	245	199	62	85	19	53	—
Black cherry	4,315	1,226	1,133	626	473	494	168	90	55	50	—
Basswood	3,435	977	459	970	622	161	30	118	39	59	—
Other hardwoods	28,039	12,864	8,332	3,245	1,757	682	517	266	273	89	14
Total hardwoods	289,394	117,973	69,835	42,702	22,904	15,621	9,276	5,202	2,791	2,807	283
All species	330,782	133,512	81,687	50,343	26,909	17,282	9,815	5,320	2,807	2,824	283

[a] Includes 45,451 thousand white oaks; 36 thousand swamp white oaks, and 126 thousand chinkapin oak trees.
[b] Includes only northern red oak trees.
[c] Includes 22,335 thousand chestnut oaks and 477 thousand post oak trees.
[d] Includes 19,392 thousand black oaks; 10,115 thousand scarlet oaks; and 77 thousand willow oak trees.

Table 39.—*Net volume of timber on commercial forest land in West Virginia, by class of timber and geographic units, 1975*

(In millions of cubic feet)

Class of timber	Northeastern	Southern	Northwestern	Total
Sawtimber trees:				
Sawlog portion	2,629.6	2,292.9	1,659.4	6,581.9
Upper-stem portion	595.3	505.7	366.2	1,467.2
All sawtimber trees	3,224.9	2,798.6	2,025.6	8,049.1
Poletimber trees	2,284.1	1,757.9	1,424.3	5,466.3
All growing-stock trees	5,509.0	4,556.5	3,449.9	13,515.4
Rough trees	717.6	486.1	245.9	1,449.6
Rotten trees	301.2	192.0	119.5	612.7
Total, all trees	6,527.8	5,234.6	3,815.3	15,577.7

Table 40.—*Net volume of growing stock on commercial forest land in West Virginia, by ownership classes, softwoods and hardwoods, and geographic units, 1975*

(In millions of cubic feet)

Ownership class and species group	Northeastern	Southern	Northwestern	Total
National Forest:				
Softwoods	185.7	32.1	—	217.8
Hardwoods	1,382.2	286.8	—	1,669.0
Total	1,567.9	318.9	—	1,886.8
Other public:				
Softwoods	5.7	3.5	6.9	16.1
Hardwoods	138.9	63.9	76.1	278.9
Total	144.6	67.4	83.0	295.0
Forest industry:				
Softwoods	37.7	14.5	35.6	87.8
Hardwoods	309.6	606.8	174.0	1,090.4
Total	347.3	621.3	209.6	1,178.2
Other private:				
Softwoods	249.7	159.0	264.6	673.3
Hardwoods	3,199.5	3,389.9	2,892.7	9,482.1
Total	3,449.2	3,548.9	3,157.3	10,155.4
All ownerships:				
Softwoods	478.8	209.1	307.1	995.0
Hardwoods	5,030.2	4,347.4	3,142.8	12,520.4
Total	5,509.0	4,556.5	3,449.9	13,515.4

Table 41.—*Net volume of sawtimber on commercial forest land in West Virginia, by ownership classes, softwoods and hardwoods, and geographic units, 1975*

(In millions of board feet)[a]

Ownership class and species group	Northeastern	Southern	Northwestern	Total
National Forest:				
Softwoods	643.7	90.5	—	734.2
Hardwoods	2,887.2	559.5	—	3,446.7
Total	3,530.9	650.0	—	4,180.9
Other public:				
Softwoods	21.7	3.7	22.4	47.8
Hardwoods	276.1	91.4	122.3	489.8
Total	297.8	95.1	144.7	537.6
Forest industry:				
Softwoods	113.3	56.3	105.2	274.8
Hardwoods	590.4	1,588.5	311.9	2,490.8
Total	703.7	1,644.8	417.1	2,765.6
Other private:				
Softwoods	567.4	386.8	588.7	1,542.9
Hardwoods	5,589.8	7,071.4	5,942.6	18,603.8
Total	6,157.2	7,458.2	6,531.3	20,146.7
All ownerships:				
Softwoods	1,346.1	537.3	716.3	2,599.7
Hardwoods	9,343.5	9,310.8	6,376.8	25,031.1
Total	10,689.6	9,848.1	7,093.1	27,630.8

[a] International 1/4-inch rule.

Table 42.—*Net volume of growing stock on commercial forest land in West Virginia, by stand-size classes, softwoods and hardwoods, and geographic units, 1975*

(In millions of cubic feet)

Stand-size class and species group	Northeastern	Southern	Northwestern	Total
Sawtimber stands:				
Softwoods	345.7	123.0	191.4	660.1
Hardwoods	3,127.6	2,787.1	1,957.7	7,872.4
Total	3,473.3	2,910.1	2,149.1	8,532.5
Poletimber stands:				
Softwoods	110.4	78.8	84.6	273.8
Hardwoods	1,683.5	1,308.1	939.9	3,931.5
Total	1,793.9	1,386.9	1,024.5	4,205.3
Other stands:				
Softwoods	22.7	7.3	31.1	61.1
Hardwoods	219.1	252.2	245.2	716.5
Total	241.8	259.5	276.3	777.6
All stands:				
Softwoods	478.8	209.1	307.1	995.0
Hardwoods	5,030.2	4,347.4	3,142.8	12,520.4
Total	5,509.0	4,556.5	3,449.9	13,515.4

Table 43.—*Net volume of sawtimber on commercial forest land in West Virginia, by stand-size classes, softwoods and hardwoods, and geographic units, 1975*

(In millions of board feet)[a]

Stand-size class and species group	Northeastern	Southern	Northwestern	Total
Sawtimber stands:				
Softwoods	1,116.0	380.5	527.3	2,023.8
Hardwoods	7,353.8	7,329.2	4,948.3	19,631.3
Total	8,469.8	7,709.7	5,475.6	21,655.1
Poletimber stands:				
Softwoods	175.8	136.4	122.9	435.1
Hardwoods	1,730.5	1,604.5	1,067.1	4,402.1
Total	1,906.3	1,740.9	1,190.0	4,837.2
Other stands:				
Softwoods	54.3	20.4	66.1	140.8
Hardwoods	259.2	377.1	361.4	997.7
Total	313.5	397.5	427.5	1,138.5
All stands:				
Softwoods	1,346.1	537.3	716.3	2,599.7
Hardwoods	9,343.5	9,310.8	6,376.8	25,031.1
Total	10,689.6	9,848.1	7,093.1	27,630.8

[a] International 1/4-inch rule.

Table 44.—*Net volume of growing stock on commercial forest land in West Virginia, by forest types and geographic units, 1975*

(In millions of cubic feet)

Forest type	Northeastern	Southern	Northwestern	Total
White and red pine	39.8	143.4	—	183.2
Spruce-fir	149.4	1.9	—	151.3
Virginia and pitch pine	127.1	31.9	271.2	430.2
Oak-pine	244.0	117.6	196.9	558.5
Oak-hickory	2,713.1	2,851.7	2,157.3	7,722.1
Elm-ash-cottonwood	372.6	143.9	248.1	764.6
Maple-beech-birch	1,863.0	1,266.1	576.4	3,705.5
All types	5,509.0	4,556.5	3,449.9	13,515.4

Table 45.—*Net volume of sawtimber on commercial forest land in West Virginia, by forest types and geographic units, 1975*
(In millions of board feet)[a]

Forest type	Northeastern	Southern	Northwestern	Total
White and red pine	67.9	253.5	—	321.4
Spruce-fir	455.7	5.9	—	461.6
Virginia and pitch pine	212.1	67.1	530.6	809.8
Oak-pine	472.8	304.2	397.2	1,174.2
Oak-hickory	4,880.2	6,169.4	4,329.9	15,379.5
Elm-ash-cottonwood	667.6	264.3	471.9	1,403.8
Maple-beech-birch	3,933.3	2,783.7	1,363.5	8,080.5
All types	10,689.6	9,848.1	7,093.1	27,630.8

[a] International 1/4-inch rule.

Table 46.—*Net volume of growing stock on commercial forest land, by species and diameter classes, Northeastern Unit, West Virginia, 1975*

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Virginia pine	103.5	17.6	28.6	21.5	20.2	8.5	4.9	2.2	—	—	—
Other yellow pines	76.8	3.3	18.5	18.6	14.7	14.3	4.0	1.6	1.8	—	—
White pine	71.0	6.8	15.4	8.1	6.5	4.9	2.4	4.5	7.9	7.6	6.9
Red spruce	138.8	4.1	12.9	18.0	28.3	22.0	27.2	13.5	7.7	5.1	—
Hemlock[a]	88.7	14.6	11.1	6.2	8.4	9.9	9.7	9.9	8.7	9.5	.7
Total softwoods	478.8	46.4	86.5	72.4	78.1	59.6	48.2	31.7	26.1	22.2	7.6
Select white oaks[b]	359.7	35.7	46.5	55.4	62.1	55.9	38.2	23.6	17.9	16.8	7.6
Select red oaks[c]	627.8	49.1	55.8	83.0	83.1	73.1	77.6	64.3	46.7	80.6	14.5
Other white oaks[d]	627.5	73.0	85.8	115.8	87.6	84.7	54.6	53.1	27.5	39.9	5.5
Other red oaks[e]	344.8	47.7	58.0	49.5	37.0	40.1	40.1	25.0	13.0	26.6	7.8
Red maple	476.0	78.7	98.3	92.3	92.1	51.3	21.0	16.4	4.5	20.4	1.0
Sugar maple	342.7	58.4	64.3	71.0	42.3	34.1	30.5	13.3	3.5	24.2	1.1
Yellow birch	105.1	25.3	26.9	18.0	5.6	2.0	6.2	2.0	6.3	12.8	—
Sweet birch	147.6	40.7	32.3	29.3	15.2	17.1	7.5	2.5	3.0	—	—
Hickory	351.9	46.3	72.7	79.0	64.2	36.8	21.4	13.5	6.1	10.6	1.3
Beech	259.8	23.6	28.2	34.0	40.8	32.8	36.5	29.2	11.7	23.0	—
Ash	100.1	11.1	15.6	11.5	16.6	14.5	14.0	10.0	3.8	3.0	—
Black walnut	21.0	2.3	5.0	2.3	.7	5.4	3.4	—	—	1.9	—
Yellow-poplar	483.3	39.4	52.2	62.4	69.0	84.7	81.3	40.1	21.7	30.5	2.0
Cucumbertree	30.2	4.7	4.0	3.7	6.4	4.0	4.5	1.3	.6	1.0	—
Blackgum	49.4	11.6	9.0	2.5	6.9	2.5	4.1	3.6	6.1	3.1	—
Black cherry	330.5	21.1	29.1	48.6	49.5	74.9	42.1	27.2	24.7	13.3	—
Basswood	132.6	5.1	12.7	28.0	23.5	16.2	15.2	6.8	8.3	16.8	—
Other hardwoods	240.2	21.7	30.7	42.3	37.9	38.2	26.4	17.3	5.4	16.3	4.0
Total hardwoods	5,030.2	595.5	727.1	828.6	740.5	668.3	524.6	349.2	210.8	340.8	44.8
All species	5,509.0	641.9	813.6	901.0	818.6	727.9	572.8	380.9	236.9	363.0	52.4

[a] Includes 1.0 million cubic feet of redcedar.
[b] Includes 358.4 million cubic feet of white oak; and 1.3 million of chinkapin oak.
[c] Includes only northern red oak.
[d] Includes 624.9 million cubic feet of chestnut oak and 2.6 million of post oak.
[e] Includes 196.9 million cubic feet of black oak; 147.1 million of scarlet oak; and 0.8 million of willow oak.

Table 47.—*Net volume of growing stock on commercial forest land, by species and diameter classes, Southern Unit, West Virginia, 1975*

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Virginia pine	30.9	5.3	7.7	7.2	5.3	2.7	1.8	0.9	—	—	—
Other yellow pines	15.4	1.2	2.4	2.7	3.5	—	3.8	.3	1.5	—	—
White pine	53.2	9.6	11.9	4.3	7.5	2.6	2.9	5.3	3.9	5.2	—
Red spruce	14.5	.3	.8	1.7	2.4	3.2	2.6	2.0	.9	.6	—
Hemlock	95.1	16.6	13.0	8.3	11.7	10.2	10.4	8.2	5.9	10.8	—
Total softwoods	209.1	33.0	35.8	24.2	30.4	18.7	21.5	16.7	12.2	16.6	—
Select white oaks[a]	433.4	46.8	56.7	58.4	65.1	55.8	52.9	40.8	24.6	27.1	5.2
Select red oaks[b]	441.1	21.3	40.1	53.8	47.9	60.3	59.9	44.9	37.5	66.3	9.1
Other white oaks[c]	452.7	63.6	58.0	53.2	46.9	54.0	43.3	38.5	33.5	52.4	9.3
Other red oaks[d]	605.0	52.7	62.8	72.2	60.1	97.6	65.9	55.6	47.5	77.9	12.7
Red maple	258.2	46.1	54.3	49.4	23.6	33.9	14.0	13.4	4.6	15.4	3.5
Sugar maple	210.4	41.5	41.0	33.0	19.1	19.2	9.6	9.4	10.5	21.9	5.2
Yellow birch	37.4	9.3	9.0	6.0	3.8	1.1	1.8	2.1	1.1	3.2	—
Sweet birch	94.2	27.2	21.3	21.1	8.9	4.8	.4	2.6	4.4	3.5	—
Hickory	459.3	58.3	73.2	80.5	76.0	56.9	48.7	34.7	15.2	15.8	—
Beech	230.5	26.5	22.1	27.6	33.5	29.6	34.3	14.0	10.9	23.0	9.0
Ash	75.7	7.7	3.8	8.2	16.9	17.5	9.3	4.1	.4	5.6	2.2
Black walnut	27.8	2.1	2.0	6.7	3.4	.9	4.0	4.3	1.2	3.2	—
Yellow-poplar	630.8	46.7	64.0	85.6	97.8	109.0	90.0	62.7	37.4	36.3	1.3
Cucumbertree	79.1	5.9	16.3	10.3	15.4	10.5	11.6	4.9	4.2	—	—
Blackgum	53.4	7.6	5.0	3.4	1.7	8.0	5.6	5.7	3.6	12.8	—
Black cherry	70.3	8.0	5.5	8.2	11.1	15.0	10.0	4.3	3.9	4.3	—
Basswood	23.2	5.0	2.5	4.5	3.1	1.9	2.7	.5	.7	2.3	—
Other hardwoods	164.9	23.8	39.6	29.7	21.3	21.2	13.8	5.8	.9	8.8	—
Total hardwoods	4,347.4	500.1	577.2	611.8	555.6	597.2	477.8	348.3	242.1	379.8	57.5
All species	4,556.5	533.1	613.0	636.0	586.0	615.9	499.3	365.0	254.3	396.4	57.5

[a] Includes only white oak.
[b] Includes only northern red oak.
[c] Includes only chestnut oak.
[d] Includes 404.2 million cubic feet of black oak; 190.2 million of scarlet oak; and 10.6 million of pin oak.

Table 48.—*Net volume of growing stock on commercial forest land, by species and diameter classes, Northwestern Unit, West Virginia, 1975*
(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Virginia pine	282.1	32.8	62.9	71.8	61.3	36.1	13.5	3.7	—	—	—
Other yellow pines	22.9	1.9	2.5	5.6	5.3	2.8	3.9	.9	—	—	—
White pine	1.3	—	—	—	—	—	—	—	.6	.7	—
Redcedar	.8	—	—	—	.8	—	—	—	—	—	—
Total softwoods	307.1	34.7	65.4	77.4	67.4	38.9	17.4	4.6	.6	.7	—
Select white oaks[a]	499.9	49.5	75.0	87.9	73.1	70.8	49.4	34.6	27.9	24.7	7.0
Select red oaks[b]	225.2	13.8	12.7	21.4	20.2	24.1	30.4	23.6	18.5	47.9	12.6
Other white oaks[c]	304.5	22.1	43.6	44.8	40.7	43.3	32.3	22.9	22.5	28.8	3.5
Other red oaks[d]	477.3	31.0	41.7	56.1	52.8	78.2	71.3	56.7	29.5	49.4	10.6
Red maple	95.7	31.3	15.9	20.0	7.1	8.4	6.7	3.0	2.5	.8	—
Sugar maple	205.5	33.9	28.3	45.4	25.6	24.4	16.2	10.3	5.4	14.9	1.1
Sweet birch	8.9	3.3	4.1	1.5	—	—	—	—	—	—	—
Hickory	362.6	105.9	79.9	62.9	35.6	37.5	19.8	10.5	6.2	4.3	—
Beech	122.0	7.1	11.1	16.1	15.0	12.2	23.4	13.5	10.0	12.6	1.0
Ash	106.4	15.0	20.0	9.4	17.8	11.5	14.3	6.6	4.4	7.4	—
Black walnut	58.4	7.0	7.3	11.4	11.8	10.3	4.2	2.1	2.2	2.1	—
Yellow-poplar	298.7	31.0	41.2	41.0	50.4	43.2	36.0	30.5	12.3	11.4	1.7
Cucumbertree	15.4	.6	2.9	2.3	4.6	.9	1.1	2.0	1.0	—	—
Blackgum	29.7	5.5	3.0	.8	4.6	4.9	1.9	4.2	1.0	3.8	—
Black cherry	52.8	4.5	7.0	6.6	7.4	11.4	5.4	3.7	3.1	3.7	—
Basswood	51.7	3.6	3.2	12.5	12.5	4.5	1.1	6.6	2.6	5.1	—
Other hardwoods	228.1	36.5	49.8	35.8	31.2	17.9	18.5	12.9	15.8	7.5	2.2
Total hardwoods	3,142.8	401.6	446.7	475.9	410.4	403.5	332.0	243.7	164.9	224.4	39.7
All species	3,449.9	436.3	512.1	553.3	477.8	442.4	349.4	248.3	165.5	225.1	39.7

[a] Includes 498.1 million cubic feet of white oak; 1.0 million of swamp white oak; and 0.8 million of chinkapin oak.
[b] Includes only northern red oak.
[c] Includes 301.4 million cubic feet of chestnut oak and 3.1 million of post oak.
[d] Includes 316.3 million cubic feet of black oak; 160.2 million of scarlet oak; and 0.8 million of willow oak.

Table 49.— *Net volume of sawtimber on commercial forest land, by species and diameter classes, Northestern Unit, West Virginia, 1975*

(In millions of board feet)[a]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Virginia pine	199.2	64.5	71.1	33.2	21.3	9.1	—	—	—
Other yellow pines	189.7	56.6	50.4	55.3	16.1	4.8	6.5	—	—
White pine	199.1	26.5	23.9	19.4	10.6	20.3	39.4	41.7	17.3
Red spruce	518.3	59.4	111.6	95.2	120.0	65.7	40.4	26.0	—
Hemlock[b]	239.8	19.2	32.4	39.2	29.4	41.7	36.9	38.1	2.9
Total softwoods	1,346.1	226.2	289.4	242.3	197.4	141.6	123.2	105.8	20.2
Select white oaks[c]	722.4	—	190.1	175.1	129.3	79.4	62.9	61.4	24.2
Select red oaks[d]	1,402.7	—	234.4	233.7	255.5	214.6	156.0	268.4	40.1
Other white oaks[e]	1,121.5	—	251.1	268.2	175.6	176.9	95.6	134.9	19.2
Other red oaks[f]	619.2	—	110.3	131.3	135.0	83.0	44.5	87.7	27.4
Red maple	619.5	—	257.6	157.0	65.3	52.7	15.3	67.8	3.8
Sugar maple	485.3	—	128.7	109.9	101.3	45.0	12.0	84.9	3.5
Yellow birch	121.7	—	14.2	7.0	24.5	7.3	27.5	41.2	—
Sweet birch	144.9	—	46.1	53.9	24.2	7.9	12.8	—	—
Hickory	474.9	—	188.6	110.5	69.5	44.0	20.4	37.3	4.6
Beech	604.7	—	113.3	109.3	131.8	116.2	47.9	86.2	—
Ash	194.8	—	47.8	46.1	46.7	31.4	12.8	10.0	—
Black walnut	37.0	—	2.2	17.3	11.2	—	—	6.3	—
Yellow-poplar	1,085.4	—	201.6	264.7	287.5	140.7	76.7	106.8	7.4
Cucumbertree	57.1	—	19.3	12.4	15.0	4.5	2.1	3.8	—
Blackgum	84.7	—	20.8	8.1	12.6	12.1	20.6	10.5	—
Black cherry	821.3	—	148.4	263.7	157.7	100.8	100.5	50.2	—
Basswood	271.8	—	62.3	51.4	50.7	22.9	28.4	56.1	—
Other hardwoods	474.6	—	110.6	121.6	92.5	57.6	22.2	56.6	13.5
Total hardwoods	9,343.5	—	2,147.4	2,141.2	1,785.9	1,197.0	758.2	1,170.1	143.7
All species	10,689.6	226.2	2,436.8	2,383.5	1,983.3	1,338.6	881.4	1,275.9	163.9

[a] International 1/4-inch rule.
[b] Includes 4.0 million board feet of redcedar.
[c] Includes 719.7 million board feet of white oak and 2.7 million of chinkapin oak.
[d] Includes only northern red oak.
[e] Includes 1,117.6 million board feet of chestnut oak and 3.9 million of post oak.
[f] Includes 363.0 million board feet of black oak and 256.2 million of scarlet oak.

Table 50.—*Net volume of sawtimber on commercial forest land, by species and diameter classes, Southern Unit, West Virginia, 1975*
(In millions of board feet) [a]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Virginia pine	63.5	22.3	19.0	10.5	7.2	4.5	—	—	—
Other yellow pines	42.9	8.5	12.5	—	15.3	.7	5.9	—	—
White pine	124.1	13.3	26.5	9.9	12.7	23.2	17.7	20.8	—
Red spruce	46.9	4.5	8.2	11.3	8.9	7.8	4.0	2.2	—
Hemlock	259.9	25.7	42.5	39.3	41.6	34.6	26.9	49.3	—
Total softwoods	537.3	74.3	108.7	71.0	85.7	70.8	54.5	72.3	—
Select white oaks[b]	947.2	—	196.5	190.6	190.0	151.8	94.9	102.9	20.5
Select red oaks[c]	1,156.4	—	140.5	201.6	216.0	166.7	142.2	258.0	31.4
Other white oaks[d]	969.9	—	136.6	177.8	152.9	141.2	125.9	199.5	36.0
Other red oaks[e]	1,490.3	—	178.5	331.3	237.8	208.8	179.8	306.5	47.6
Red maple	367.2	—	65.0	111.5	51.0	49.5	17.8	58.7	13.7
Sugar maple	332.6	—	56.8	62.5	34.6	34.4	40.2	83.8	20.3
Yellow birch	43.1	—	10.9	3.5	6.5	7.7	3.7	10.8	—
Sweet birch	83.3	—	25.3	15.5	1.3	9.6	17.6	14.0	—
Hickory	856.0	—	227.9	194.5	178.4	132.7	58.8	63.7	—
Beech	542.6	—	97.6	96.5	122.8	53.1	43.3	93.3	36.0
Ash	186.5	—	49.1	56.9	33.1	14.2	1.2	22.3	9.7
Black walnut	60.1	—	10.0	3.0	14.8	15.9	4.3	12.1	—
Yellow-poplar	1,534.1	—	292.3	367.7	333.7	241.1	148.8	145.9	4.6
Cucumbertree	156.6	—	45.3	34.1	42.5	17.9	16.8	—	—
Blackgum	137.6	—	4.7	26.3	21.3	21.4	14.0	49.9	—
Black cherry	171.2	—	32.2	50.5	37.5	17.1	17.1	16.8	—
Basswood	34.1	—	7.7	5.8	9.3	1.6	2.4	7.3	—
Other hardwoods	242.0	—	63.1	69.9	49.9	21.0	4.0	34.1	—
Total hardwoods	9,310.8	—	1,640.0	1,999.5	1,733.4	1,305.7	932.8	1,479.6	219.8
All species	9,848.1	74.3	1,748.7	2,070.5	1,819.1	1,376.5	987.3	1,551.9	219.8

[a] International 1/4-inch rule.
[b] Includes only white oak.
[c] Includes only northern red oak.
[d] Includes only chestnut oak.
[e] Includes 1,036.6 million board feet of black oak; 422.8 million of scarlet oak; and 30.9 million of pin oak.

Table 51.—*Net volume of sawtimber on commercial forest land, by species and diameter classes, Northwestern Unit, West Virginia, 1975*

(In millions of board feet)[a]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Virginia pine	640.5	217.4	212.2	139.9	55.3	15.7	—	—	—
Other yellow pines	67.6	17.4	18.8	11.0	15.8	4.6	—	—	—
White pine	5.6	—	—	—	—	—	2.7	2.9	—
Redcedar	2.6	—	2.6	—	—	—	—	—	—
Total softwoods	716.3	234.8	233.6	150.9	71.1	20.3	2.7	2.9	—
Select white oaks[b]	998.5	—	228.7	245.7	174.2	127.9	102.5	92.6	26.9
Select red oaks[c]	644.7	—	63.5	82.6	109.8	86.7	69.6	183.7	48.8
Other white oaks[d]	677.2	—	126.0	147.0	114.4	82.3	83.8	109.6	14.1
Other red oaks[e]	1,244.9	—	166.7	269.9	258.2	212.0	110.1	187.6	40.4
Red maple	99.2	—	21.5	28.9	24.2	11.6	9.5	3.5	—
Sugar maple	340.1	—	77.9	83.5	58.0	38.3	20.3	57.8	4.3
Hickory	389.7	—	111.2	130.7	69.8	38.5	23.0	16.5	—
Beech	312.0	—	45.2	41.5	82.8	50.0	38.8	49.4	4.3
Ash	209.7	—	53.8	38.4	49.8	23.6	16.0	28.1	—
Black walnut	109.7	—	35.7	35.1	14.7	7.7	8.2	8.3	—
Yellow-poplar	648.2	—	158.0	151.7	128.4	114.2	45.4	43.3	7.2
Cucumbertree	33.6	—	14.8	3.1	3.9	7.8	4.0	—	—
Blackgum	73.8	—	14.5	16.6	7.1	15.8	4.0	15.8	—
Black cherry	119.6	—	22.4	39.5	18.8	13.8	10.9	14.2	—
Basswood	111.6	—	38.7	16.1	4.3	23.9	9.6	19.0	—
Other hardwoods	364.3	—	95.0	60.2	65.1	47.5	59.8	28.5	8.2
Total hardwoods	6,376.8	—	1,273.6	1,390.5	1,183.5	901.6	615.5	857.9	154.2
All species	7,093.1	234.8	1,507.2	1,541.4	1,254.6	921.9	618.2	860.8	154.2

[a] International 1/4-inch rule.
[b] Includes 995.1 million board feet of white oak and 3.4 million of swamp white oak.
[c] Includes only northern red oak.
[d] Includes 673.5 million board feet of chestnut oak and 3.7 million of post oak.
[e] Includes 821.5 million board feet of black oak and 423.4 million of scarlet oak.

Table 52.—*Net volume of sawtimber on commercial forest land, by species and quality classes, Northeastern Unit, West Virginia, 1975*

(In millions of board feet)[a]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[b]
Softwoods:					
White pine	199.1	14.8	43.8	120.7	19.8
Virginia pine	199.2	4.0	5.4	189.8	—
Other yellow pines	189.7	10.8	13.8	165.1	—
Other softwoods[c]	758.1	—	—	—	—
Total softwoods	1,346.1	29.6	63.0	475.6	19.8
Hardwoods:					
Select white oaks	722.4	48.7	105.2	467.3	101.2
Select red oaks	1,402.7	283.7	296.2	670.1	152.7
Other white oaks	1,121.5	128.1	176.9	589.3	227.2
Other red oaks	619.2	94.1	94.6	354.6	75.9
Red maple	619.5	57.0	70.9	364.5	127.1
Sugar maple	485.3	40.8	62.3	299.7	82.5
Yellow birch	121.7	19.4	21.5	53.1	27.7
Sweet birch	144.9	10.6	27.3	86.0	21.0
Hickory	474.9	36.5	59.7	271.0	107.7
Beech	604.7	42.1	75.7	329.7	157.2
Ash	194.8	22.2	55.7	84.1	32.8
Black walnut	37.0	—	4.0	29.0	4.0
Yellow-poplar	1,085.4	225.4	174.8	516.1	169.1
Cucumbertree	57.1	2.9	7.8	35.8	10.6
Blackgum	84.7	13.3	17.3	44.9	9.2
Black cherry	821.3	136.8	163.5	361.5	159.5
Basswood	271.8	45.0	64.1	125.4	37.3
Other hardwoods	474.6	37.8	65.5	285.3	86.0
Total hardwoods	9,343.5	1,244.4	1,543.0	4,967.4	1,588.7
			Percent		
Hardwood quality	100	13	17	53	17

[a] International 1/4-inch rule.

[b] Grade 4 applies only to white pine. For hardwoods the volumes in this column are for construction logs.

[c] Species other than pine are not graded into standard-lumber grades.

Table 53.—*Net volume of sawtimber on commercial forest land, by species and quality classes, Southern Unit West Virginia, 1975*

(In millions of board feet)[a]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[b]
Softwoods:					
White pine	124.1	7.3	23.5	62.6	30.7
Virginia pine	63.5	7.3	4.1	52.1	—
Other yellow pines	42.9	3.1	4.8	35.0	—
Other softwoods[c]	306.8	—	—	—	—
Total softwoods	537.3	17.7	32.4	149.7	30.7
Hardwoods:					
Select white oaks	947.2	65.2	172.1	458.7	251.2
Select red oaks	1,156.4	335.5	245.3	424.8	150.8
Other white oaks	969.9	108.4	214.5	391.2	255.8
Other red oaks	1,490.3	266.7	278.1	590.7	354.8
Red maple	367.2	61.2	64.7	131.9	109.4
Sugar maple	332.6	67.4	74.9	107.1	83.2
Yellow birch	43.1	6.1	7.1	23.4	6.5
Sweet birch	83.3	16.0	17.4	28.5	21.4
Hickory	856.0	103.2	143.3	343.7	265.8
Beech	542.6	67.9	85.4	227.1	162.2
Ash	186.5	28.1	42.6	79.1	36.7
Black walnut	60.1	2.8	15.4	36.3	5.6
Yellow-poplar	1,534.1	382.5	330.9	542.3	278.4
Cucumbertree	156.6	17.7	33.5	67.2	38.2
Blackgum	137.6	29.2	42.1	49.2	17.1
Black cherry	171.2	30.6	35.9	61.4	43.3
Basswood	34.1	4.6	7.8	15.9	5.8
Other hardwoods	242.0	10.4	42.5	130.9	58.2
Total hardwoods	9,310.8	1,603.5	1,853.5	3,709.4	2,144.4
			Percent		
Hardwood quality	100	17	20	40	23

[a] International 1/4-inch rule.

[b] Grade 4 applies only to white pine. For hardwoods the volumes in this column are for construction logs.

[c] Species other than pine are not graded into standard-lumber grades.

Table 54.—*Net volume of sawtimber on commercial forest land, by species and quality classes, Northwestern Unit, West Virginia, 1975*
(In millions of board feet)[a]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[b]
Softwoods:					
White pine	5.6	—	1.4	1.7	2.5
Virginia pine	640.5	5.2	17.6	617.7	—
Other yellow pines	67.6	4.3	3.1	60.2	—
Other softwoods[c]	2.6	—	—	—	—
Total softwoods	716.3	9.5	22.1	679.6	2.5
Hardwoods:					
Select white oaks	998.5	68.1	153.8	444.6	332.0
Select red oaks	644.7	123.2	164.5	246.4	110.6
Other white oaks	677.2	60.8	127.2	309.3	179.9
Other red oaks	1,244.9	134.6	160.4	488.8	461.1
Red maple	99.2	5.4	10.1	49.4	34.3
Sugar maple	340.1	36.1	50.7	138.4	114.9
Hickory	389.7	21.3	34.3	184.5	149.6
Beech	312.0	10.7	32.1	134.5	134.7
Ash	209.7	28.9	39.4	98.2	43.2
Black walnut	109.7	2.4	8.1	66.1	33.1
Yellow-poplar	648.2	50.9	94.3	278.9	224.1
Cucumbertree	33.6	2.6	6.2	22.0	2.8
Blackgum	73.8	12.2	17.3	31.8	12.5
Black cherry	119.6	2.3	19.5	60.9	36.9
Basswood	111.6	7.5	23.8	62.0	18.3
Other hardwoods	364.3	17.6	41.8	203.4	101.5
Total hardwoods	6,376.8	584.6	983.5	2,819.2	1,989.5
			Percent		
Hardwood quality	100	9	16	44	31

[a] International 1/4-inch rule.
[b] Grade 4 applies only to white pine. For hardwoods the volumes in this column are for construction logs.
[c] Species other than pine are not graded into standard-lumber grades.

Table 55.—*Current annual net growth and removals of growing stock on commercial forest land in West Virginia, by species and geographic units, 1974*

(In thousands of cubic feet)

Species	Annual net growth			Annual timber removals		
	Northeastern	Southern	Northwestern	Northeastern	Southern	Northwestern
Softwoods:						
Virginia pine	21,800	1,700	7,900	3,000	—	—
White pine	5,700	600	4,100	—	—	—
Other softwoods	11,500	3,500	1,800	1,100	6,500	—
Total softwoods	39,000	5,800	13,800	4,100	6,500	—
Hardwoods:						
Select white oaks	5,800	7,300	33,200	7,800	8,100	1,500
Select red oaks	28,400	13,700	12,600	7,100	8,200	4,100
Other white oaks	14,400	8,900	3,800	5,700	4,400	—
Other red oaks	9,000	7,400	16,600	4,400	10,700	3,000
Maples	32,000	24,300	17,000	9,000	3,500	400
Hickory	2,700	5,200	10,500	5,100	6,000	700
Beech	2,300	7,500	2,800	5,100	12,800	1,900
Ash, black cherry & walnut	26,200	5,400	8,100	1,800	800	900
Yellow-poplar	24,000	41,500	12,600	10,600	10,800	6,200
Other hardwoods	16,500	7,800	7,400	4,800	5,500	4,600
Total hardwoods	161,300	129,000	124,600	61,400	70,800	23,300
Total, all species	200,300	134,800	138,400	65,500	77,300	23,300

Table 56.—*Current annual net growth and removals of sawtimber on commercial forest land in West Virginia, by species and geographic units, 1974*

(In thousands of board feet)[a]

Species	Annual net growth			Annual timber removals		
	Northeastern	Southern	Northwestern	Northeastern	Southern	Northwestern
Softwoods:						
Virginia pine	62,700	2,900	31,200	3,500	—	—
White pine	11,000	6,700	15,900	—	—	—
Other softwoods	32,300	6,200	3,100	2,000	22,300	—
Total softwoods	106,000	15,800	50,200	5,500	22,300	—
Hardwoods:						
Select white oaks	9,400	13,700	51,900	18,100	22,300	4,700
Select red oaks	53,200	32,400	22,700	15,100	23,100	13,100
Other white oaks	23,100	8,400	11,000	13,900	12,000	—
Other red oaks	10,200	17,200	33,800	8,300	30,400	9,600
Maples	34,900	29,100	15,800	22,300	9,500	1,200
Hickory	4,100	7,600	9,800	11,800	16,400	2,200
Beech	5,500	10,500	5,700	10,200	35,500	6,000
Ash, black cherry & walnut	48,100	5,400	8,600	4,000	2,100	2,700
Yellow-poplar	58,100	58,200	22,400	22,800	30,200	19,600
Other hardwoods	21,800	8,800	9,600	9,100	14,900	14,100
Total hardwoods	268,400	191,300	191,300	135,600	196,500	73,200
Total, all species	374,400	207,100	241,500	141,100	218,800	73,200

[a] International 1/4-inch rule.

Table 57.—*Land area in West Virginia, by land classes, counties, and geographic units, 1975.*

County	Total land area[a]	Nonforest land area	Forest land		Sampling error of total[c]
			Non-commercial[b]	Commercial	
	Thousand acres				*Percent*
Barbour	218.2	81.4	0.9	135.9	10
Berkeley	202.2	83.0	1.2	118.0	12
Braxton	330.9	77.9	1.0	252.0	6
Grant	305.9	67.6	2.1	236.2	6
Hampshire	409.0	87.7	1.7	319.6	5
Hardy	374.4	71.6	5.1	297.7	5
Harrison	267.5	120.2	2.5	144.8	13
Jefferson	134.9	96.3	2.1	36.5	35
Lewis	250.9	82.6	.7	167.6	9
Mineral	211.2	44.6	.7	165.9	6
Morgan	149.1	32.2	6.6	110.3	7
Pendleton	444.8	109.4	34.2	301.2	6
Pocahontas	603.5	84.9	15.3	503.3	7
Preston	412.8	110.7	1.4	300.7	6
Randolph	663.0	80.6	13.3	569.1	4
Taylor	111.4	45.1	1.4	64.9	15
Tucker	269.5	38.6	20.2	210.7	9
Upshur	225.3	70.5	.8	154.0	8
Webster	352.6	27.7	8.1	316.8	3
Northeastern Unit	5,937.1	1,412.6	119.3	4,405.2	1.4
Boone	320.6	56.6	—	264.0	10
Clay	219.5	29.8	—	189.7	6
Fayette	424.3	84.7	3.9	335.7	5
Greenbrier	656.7	154.8	1.0	500.9	4
Kanawha	580.4	122.3	—	458.1	4
Logan	291.9	56.0	3.3	232.6	10
McDowell	341.1	64.1	—	277.0	11
Mercer	266.8	77.1	.5	189.2	6
Mingo	270.7	47.9	—	222.8	10
Monroe	302.5	116.5	—	186.0	8
Nicholas	416.0	78.4	.3	337.3	6
Raleigh	387.3	88.5	1.4	297.4	5
Summers	223.8	60.4	4.4	159.0	6
Wyoming	322.6	52.3	6.8	263.5	5
Southern Unit	5,024.2	1,089.4	21.6	3,913.2	1.8
Brooke	56.4	29.8	—	26.6	27
Cabell	178.7	47.0	0.3	131.4	8
Calhoun	179.8	41.3	—	138.5	9
Doddridge	204.2	53.9	—	150.3	9
Gilmer	217.0	54.0	2.1	160.9	9
Hancock	53.2	26.4	1.5	25.3	27
Jackson	294.7	103.3	.2	191.2	8
Lincoln	280.3	33.4	—	246.9	4
Marion	199.0	65.6	1.2	132.2	10
Marshall	194.7	78.2	—	116.5	12
Mason	276.8	113.4	.4	163.0	10
Monongalia	233.5	83.8	.2	149.5	11
Ohio	68.0	30.6	—	37.4	21

Continued

Table 57.—Continued

County	Total land area[a]	Nonforest land area	Forest land		
			Non-commercial	Commercial	Sampling error of total[c]
	Thousand acres				*Percent*
Pleasants	82.7	14.2	.1	68.4	8
Putnam	222.7	66.4	—	156.3	7
Ritchie	289.3	72.1	1.8	215.4	6
Roane	311.0	99.6	—	211.4	9
Tyler	163.6	44.3	—	119.3	9
Wayne	328.6	63.4	.1	265.1	5
Wetzel	232.1	50.1	.1	181.9	6
Wirt	150.4	27.3	—	123.1	6
Wood	235.8	81.1	—	154.7	9
Northwestern Unit	4,452.5	1,279.2	8.0	3,165.3	1.9
Total, State	15,413.8	3,781.2	148.9	11,483.7	1.0

[a] Source: Area Measurement Report, Bureau of the Census, Areas of West Virginia: 1960 (April 1967).
[b] Includes nonproductive and productive-reserved forest land.
[c] In percent at the 68 percent probability level for commercial forest land.

Table 58. ***Area of commercial forest land in West Virginia, by stand-size class, county, and geographic unit, 1975***
(In thousands of acres)

County	Sawtimber stands	Poletimber stands	Sapling-and-seedling stands[a]	Total
Barbour	49.9	51.0	35.0	135.9
Berkeley	34.7	45.4	37.9	118.0
Braxton	105.4	90.6	56.0	252.0
Grant	82.3	92.6	61.3	236.2
Hampshire	107.5	134.4	77.7	319.6
Hardy	103.7	127.3	66.7	297.7
Harrison	36.8	51.0	57.0	144.8
Jefferson	7.4	10.4	18.7	36.5
Lewis	57.4	63.9	46.3	167.6
Mineral	53.3	68.0	44.6	165.9
Morgan	33.6	47.0	29.7	110.3
Pendleton	108.5	119.7	73.0	301.2
Pocahontas	254.6	190.1	58.6	503.3
Preston	117.5	113.0	70.2	300.7
Randolph	301.0	200.0	68.1	569.1
Taylor	18.4	23.4	23.1	64.9
Tucker	95.1	76.7	38.9	210.7
Upshur	62.5	56.1	35.4	154.0
Webster	156.3	121.6	38.9	316.8
Northeastern Unit	1,785.9	1,682.2	937.1	4,405.2

Continued

Table 58.—Continued

County	Sawtimber stands	Poletimber stands	Sapling-and-seedling stands [a]	Total
Boone	163.4	57.8	42.8	264.0
Clay	86.8	71.5	31.4	189.7
Fayette	153.2	124.5	58.0	335.7
Greenbrier	258.8	172.6	69.5	500.9
Kanawha	209.0	165.9	83.2	458.1
Logan	147.0	46.4	39.2	232.6
McDowell	146.5	65.3	65.2	277.0
Mercer	92.5	65.4	31.3	189.2
Mingo	130.1	48.5	44.2	222.8
Monroe	66.6	73.1	46.3	186.0
Nicholas	142.6	130.2	64.5	337.3
Raleigh	136.5	106.5	54.4	297.4
Summers	76.5	55.0	27.5	159.0
Wyoming	114.4	97.7	51.4	263.5
Southern Unit	1,923.9	1,280.4	708.9	3,913.2
Brooke	8.7	7.8	10.1	26.6
Cabell	49.5	42.9	39.0	131.4
Calhoun	49.0	45.1	44.4	138.5
Doddridge	72.6	43.3	34.4	150.3
Gilmer	72.9	48.2	39.8	160.9
Hancock	9.8	7.9	7.6	25.3
Jackson	78.7	61.1	51.4	191.2
Lincoln	110.6	82.8	53.5	246.9
Marion	60.1	37.2	34.9	132.2
Marshall	41.3	37.4	37.8	116.5
Mason	64.6	50.9	47.5	163.0
Monongalia	71.1	42.9	35.5	149.5
Ohio	14.7	11.8	10.9	37.4
Pleasants	40.7	19.2	8.5	68.4
Putnam	73.1	50.0	33.2	156.3
Ritchie	104.6	66.4	44.4	215.4
Roane	76.7	70.3	64.4	211.4
Tyler	51.7	36.7	30.9	119.3
Wayne	100.2	88.9	76.0	265.1
Wetzel	81.5	58.4	42.0	181.9
Wirt	64.8	39.5	18.8	123.1
Wood	69.0	48.3	37.4	154.7
Northwestern Unit	1,365.9	997.0	802.4	3,165.3
Total, State	5,075.7	3,959.6	2,448.4	11,483.7

[a] Includes 86,100 acres in nonstocked areas in the Northeastern Unit; 34,600 acres in the Southern Unit; and 10,700 acres in the Northwestern Unit.

Table 59.—*Area of commercial forest land in West Virginia, by forest type, county, and geographic unit, 1975*
(In thousands of acres)

County	Virginia and pitch pine	Other softwood types	Oak-hickory	Maple-beech-birch	Other hardwood types	All types
Barbour	0.7	1.9	74.5	37.4	21.4	135.9
Berkeley	13.5	1.5	72.9	8.0	22.1	118.0
Braxton	1.2	3.9	136.9	73.2	36.8	252.0
Grant	26.1	2.4	142.3	20.9	44.5	236.2
Hampshire	31.9	3.9	199.3	19.4	65.1	319.6
Hardy	32.4	3.2	183.5	18.8	59.8	297.7
Harrison	.6	2.7	73.6	36.3	31.6	144.8
Jefferson	3.4	.3	23.3	3.0	6.5	36.5
Lewis	1.2	2.7	93.6	44.8	25.3	167.6
Mineral	24.7	1.7	96.2	10.1	33.2	165.9
Morgan	16.4	1.0	62.8	6.5	23.6	110.3
Pendleton	27.5	5.3	178.5	26.4	63.5	301.2
Pocahontas	1.6	33.5	177.8	242.2	48.2	503.3
Preston	1.8	4.2	167.3	84.9	42.5	300.7
Randolph	1.6	9.1	270.6	236.2	51.6	569.1
Taylor	.3	1.1	34.1	16.8	12.6	64.9
Tucker	.5	5.8	102.7	77.4	24.3	210.7
Upshur	.8	2.1	84.5	44.0	22.6	154.0
Webster	1.3	3.5	162.6	119.0	30.4	316.8
Northeastern Unit	187.5	89.8	2,337.0	1,125.3	665.6	4,405.2
Boone	—	2.8	160.4	92.3	8.5	264.0
Clay	2.6	3.2	127.3	43.8	12.8	189.7
Fayette	4.9	4.4	225.2	78.1	23.1	335.7
Greenbrier	5.5	12.4	281.4	166.2	35.4	500.9
Kanawha	7.4	8.5	305.3	105.4	31.5	458.1
Logan	—	3.6	150.4	68.1	10.5	232.6
McDowell	—	4.6	174.0	81.8	16.6	277.0
Mercer	2.2	2.6	126.3	45.6	12.5	189.2
Mingo	—	3.3	139.8	68.7	11.0	222.8
Monroe	7.0	3.9	122.3	37.5	15.3	186.0
Nicholas	6.1	3.9	217.8	85.8	23.7	337.3
Raleigh	4.5	3.1	199.7	69.5	20.6	297.4
Summers	2.3	2.8	104.7	38.3	10.9	159.0
Wyoming	5.7	11.3	171.4	57.7	17.4	263.5
Southern Unit	48.2	70.4	2,506.0	1,038.8	249.8	3,913.2
Brooke	1.2	—	17.7	3.8	3.9	26.6
Cabell	13.1	—	79.7	17.8	20.8	131.4
Calhoun	17.1	—	79.7	18.4	23.3	138.5
Doddridge	4.2	—	103.1	21.7	21.3	150.3
Gilmer	5.1	—	109.7	22.2	23.9	160.9
Hancock	.9	—	16.5	4.3	3.6	25.3
Jackson	19.4	—	116.3	27.1	28.4	191.2
Lincoln	7.8	—	161.0	39.5	38.6	246.9
Marion	4.5	—	91.3	18.2	18.2	132.2
Marshall	4.8	—	75.3	18.6	17.8	116.5
Mason	27.4	—	90.6	20.9	24.1	163.0
Monongalia	4.2	—	102.5	21.6	21.2	149.5
Ohio	1.5	—	24.6	5.9	5.4	37.4
Pleasants	3.3	—	45.7	10.0	9.4	68.4

Continued

Table 59.—Continued

County	Virginia and pitch pine	Other softwood types	Oak-hickory	Maple-beech-birch	Other hardwood types	All types
Putnam	23.3	—	89.2	21.6	22.2	156.3
Ritchie	12.2	—	139.9	31.0	32.3	215.4
Roane	19.4	—	128.8	31.4	31.8	211.4
Tyler	7.4	—	76.6	17.2	18.1	119.3
Wayne	21.1	—	163.1	38.1	42.8	265.1
Wetzel	5.4	—	120.3	27.7	28.5	181.9
Wirt	20.9	—	67.1	16.9	18.2	123.1
Wood	25.3	—	86.4	20.6	22.4	154.7
Northwestern Unit	249.5	—	1,985.1	454.5	476.2	3,165.3
Total, State	485.2	160.2	6,828.1	2,618.6	1,391.6	11,483.7

Table 60.—*Net volume of growing stock on commercial forest land in West Virginia, by stand-size class, county, and geographic unit, 1975*

County	Sawtimber stands	Poletimber stands	Other stands	Total	Sampling error of total
	Million cubic feet				*Percent*
Barbour	79.2	57.3	10.4	146.9	17
Berkeley	46.1	45.4	7.5	99.0	15
Braxton	175.6	103.5	16.8	295.9	11
Grant	127.3	95.1	12.6	235.0	11
Hampshire	140.4	140.2	18.1	298.7	10
Hardy	140.1	135.3	15.6	291.0	10
Harrison	53.2	51.8	14.9	119.9	23
Jefferson	9.3	9.9	2.8	22.0	31
Lewis	86.8	70.0	14.9	171.7	14
Mineral	73.7	71.2	10.3	155.2	15
Morgan	48.3	47.3	6.7	102.3	18
Pendleton	148.8	125.1	15.3	289.2	11
Pocahontas	653.5	188.0	16.3	857.8	14
Preston	191.4	128.2	22.0	341.6	12
Randolph	751.6	219.5	18.5	989.6	9
Taylor	26.9	24.6	6.3	57.8	23
Tucker	253.1	80.0	8.5	341.6	17
Upshur	103.0	64.6	10.2	177.8	15
Webster	365.0	136.9	14.1	516.0	9
Northeastern Unit	3,473.3	1,793.9	241.8	5,509.0	2.8

Continued

Table 60.—Continued

County	Sawtimber stands	Poletimber stands	Other stands	Total	Sampling error of total
Boone	195.4	61.9	13.0	270.3	18
Clay	134.2	78.3	12.6	225.1	13
Fayette	234.9	135.1	23.0	393.0	11
Greenbrier	516.3	187.2	24.9	728.4	8
Kanawha	325.9	180.6	32.0	538.5	8
Logan	173.2	51.3	11.8	236.3	17
McDowell	168.4	70.4	20.7	259.5	21
Mercer	147.3	71.1	11.9	230.3	11
Mingo	153.4	52.7	13.8	219.9	17
Monroe	96.3	76.5	18.9	191.7	14
Nicholas	253.9	137.0	25.5	416.4	12
Raleigh	211.0	114.1	21.0	346.1	11
Summers	120.6	59.8	10.7	191.1	13
Wyoming	179.3	110.9	19.7	309.9	12
Southern Unit	2,910.1	1,386.9	259.5	4,556.5	3.2
Brooke	13.3	7.6	2.9	23.8	29
Cabell	75.3	42.5	13.7	131.5	15
Calhoun	73.6	43.6	15.6	132.8	14
Doddridge	120.8	44.5	10.8	176.1	13
Gilmer	119.1	49.0	12.8	180.9	13
Hancock	14.8	8.3	2.3	25.4	29
Jackson	121.4	62.5	17.6	201.5	12
Lincoln	170.0	86.7	20.1	276.8	11
Marion	100.5	36.8	10.7	148.0	14
Marshall	61.1	37.2	12.3	110.6	16
Mason	100.7	51.6	16.5	168.8	13
Monongalia	117.9	44.8	10.6	173.3	14
Ohio	22.2	12.1	3.6	37.9	24
Pleasants	69.2	22.0	2.8	94.0	17
Putnam	115.2	53.1	12.7	181.0	12
Ritchie	168.9	71.4	15.1	255.4	10
Roane	112.6	68.9	23.1	204.6	12
Tyler	82.5	37.6	10.5	130.6	16
Wayne	149.7	88.0	27.8	265.5	10
Wetzel	128.1	61.3	14.3	203.7	12
Wirt	103.0	44.0	7.3	154.3	12
Wood	109.2	51.0	13.2	173.4	12
Northwestern Unit	2,149.1	1,024.5	276.3	3,449.9	2.9
Total, State	8,532.5	4,205.3	777.6	13,515.4	1.6

Table 61.—*Net volume of sawtimber on commercial forest land in West Virginia, by stand-size class, county, and geographic unit, 1975*

County	Sawtimber stands	Poletimber stands	Other stands	Total	Sampling error of total
	Million board feet [a]				*Percent*
Barbour	188.6	63.8	12.8	265.2	25
Berkeley	108.8	47.8	10.7	167.3	21
Braxton	423.8	116.1	20.7	560.6	16
Grant	287.3	96.9	17.5	401.7	18
Hampshire	328.4	151.4	28.1	507.9	15
Hardy	330.4	143.2	22.5	496.1	16
Harrison	128.4	55.1	17.9	201.4	36
Jefferson	21.9	10.4	3.4	35.7	42
Lewis	205.1	75.4	18.5	299.0	21
Mineral	174.4	73.5	12.4	260.3	25
Morgan	114.2	46.5	8.7	169.4	32
Pendleton	325.9	132.3	22.5	480.7	16
Pocahontas	1,554.7	181.8	20.3	1,756.8	21
Preston	456.3	142.8	26.9	626.0	18
Randolph	1,840.0	235.7	22.9	2,098.6	13
Taylor	64.2	26.3	7.6	98.1	35
Tucker	666.9	84.4	9.7	761.0	25
Upshur	246.7	73.4	12.3	332.4	22
Webster	1,003.8	149.5	18.1	1,171.4	14
Northeastern Unit	8,469.8	1,906.3	313.5	10,689.6	4.2
Boone	544.8	82.7	30.3	657.8	21
Clay	353.6	99.8	16.4	469.8	20
Fayette	620.5	172.1	30.3	822.9	16
Greenbrier	1,293.8	220.2	33.6	1,547.6	11
Kanawha	862.7	226.2	42.3	1,131.2	12
Logan	479.0	70.2	25.1	574.3	20
McDowell	465.0	93.2	45.2	603.4	26
Mercer	394.5	89.6	15.6	499.7	16
Mingo	425.1	71.0	30.4	526.5	20
Monroe	247.9	91.6	27.4	366.9	21
Nicholas	675.3	167.7	32.7	875.7	17
Raleigh	561.2	143.9	27.0	732.1	15
Summers	321.5	74.8	14.4	410.7	19
Wyoming	464.8	137.9	26.8	629.5	17
Southern Unit	7,709.7	1,740.9	397.5	9,848.1	4.3
Brooke	33.7	8.9	4.7	47.3	40
Cabell	189.3	48.4	20.8	258.5	23
Calhoun	184.3	49.1	23.1	256.5	20
Doddridge	320.0	52.3	16.6	388.9	19
Gilmer	311.4	58.1	19.4	388.9	19
Hancock	36.9	9.7	4.1	50.7	41
Jackson	303.8	71.9	27.5	403.2	17
Lincoln	431.5	101.7	29.7	562.9	17
Marion	268.7	42.5	16.7	327.9	21
Marshall	153.2	42.7	18.8	214.7	24
Mason	251.8	58.4	27.3	337.5	19
Monongalia	309.5	53.4	17.5	380.4	19
Ohio	55.8	14.3	5.9	76.0	34
Pleasants	181.4	26.9	4.6	212.9	26

Continued

Table 61.—Continued

County	Sawtimber stands	Poletimber stands	Other stands	Total	Sampling error of total
Putnam	289.2	60.8	20.4	370.4	18
Ritchie	432.3	85.9	23.8	542.0	15
Roane	280.5	77.1	34.9	392.5	18
Tyler	212.4	44.2	15.9	272.5	23
Wayne	375.3	100.3	40.6	516.2	16
Wetzel	325.9	73.1	21.5	420.5	19
Wirt	255.0	51.6	11.9	318.5	18
Wood	273.7	58.7	21.8	354.2	18
Northwestern Unit	5,475.6	1,190.0	427.5	7,093.1	4.3
Total, State	21,655.1	4,837.2	1,138.5	27,630.8	2.4

[a] International 1/4-inch rule.

Table 62.—*Net volume of growing stock on commercial forest land in West Virginia, by forest type, county, and geographic unit, 1975*
(In millions of cubic feet)

County	Virginia and pitch pine	Other softwood types	Oak-hickory	Maple-beech-birch	Other hardwood types	All types
Barbour	0.6	3.2	77.8	46.0	19.3	146.9
Berkeley	7.8	1.2	62.4	9.9	17.7	99.0
Braxton	1.1	8.3	155.4	94.7	36.4	295.9
Grant	18.6	2.1	144.8	30.5	39.0	235.0
Hampshire	19.8	3.0	192.6	26.7	56.6	298.7
Hardy	22.3	2.8	183.5	28.6	53.8	291.0
Harrison	.5	3.4	63.0	34.1	18.9	119.9
Jefferson	2.0	.2	13.5	2.1	4.2	22.0
Lewis	1.0	4.1	93.9	51.5	21.2	171.7
Mineral	15.4	1.2	93.6	15.8	29.2	155.2
Morgan	12.2	.6	58.5	10.7	20.3	102.3
Pendleton	18.5	5.7	177.6	33.7	53.7	289.2
Pocahontas	1.7	88.2	265.3	451.6	51.0	857.8
Preston	1.6	7.7	183.7	107.8	40.8	341.6
Randolph	1.4	26.9	421.3	474.8	65.2	989.6
Taylor	.3	1.4	31.1	16.8	8.2	57.8
Tucker	.4	16.7	164.4	140.5	19.6	341.6
Upshur	.7	4.2	93.5	57.0	22.4	177.8
Webster	1.2	8.3	237.2	230.2	39.1	516.0
Northeastern Unit	127.1	189.2	2,713.1	1,863.0	616.6	5,509.0

Continued

Table 62.—Continued

County	Virginia and pitch pine	Other softwood types	Oak-hickory	Maple-beech-birch	Other hard-wood types	All types
Boone	—	7.0	171.7	85.0	6.6	270.3
Clay	1.6	5.7	150.1	53.7	14.0	225.1
Fayette	3.1	6.2	264.3	94.3	25.1	393.0
Greenbrier	3.9	29.2	371.1	277.5	46.7	728.4
Kanawha	4.9	16.1	355.6	127.3	34.6	538.5
Logan	—	8.9	157.3	62.1	8.0	236.3
McDowell	—	11.3	161.6	74.3	12.3	259.5
Mercer	1.4	4.6	153.2	56.2	14.9	230.3
Mingo	—	8.0	141.4	62.3	8.2	219.9
Monroe	5.0	7.2	124.7	41.1	13.7	191.7
Nicholas	3.7	4.7	250.0	134.6	23.4	416.4
Raleigh	2.8	3.7	233.4	83.3	22.9	346.1
Summers	1.5	5.4	125.7	45.7	12.8	191.1
Wyoming	4.0	27.3	191.6	68.7	18.3	309.9
Southern Unit	31.9	145.3	2,851.7	1,266.1	261.5	4,556.5
Brooke	0.8	—	15.7	4.2	3.1	23.8
Cabell	13.5	—	78.6	21.2	18.2	131.5
Calhoun	17.7	—	74.0	21.6	19.5	132.8
Doddridge	2.8	—	123.7	29.5	20.1	176.1
Gilmer	3.2	—	126.5	28.9	22.3	180.9
Hancock	.8	—	15.9	5.5	3.2	25.4
Jackson	22.9	—	118.9	33.0	26.7	201.5
Lincoln	5.8	—	182.1	53.3	35.6	276.8
Marion	2.8	—	104.6	24.3	16.3	148.0
Marshall	3.4	—	70.4	22.1	14.7	110.6
Mason	32.5	—	89.1	24.5	22.7	168.8
Monongalia	3.0	—	120.8	29.1	20.4	173.3
Ohio	1.1	—	24.6	7.3	4.9	37.9
Pleasants	4.5	—	64.1	14.4	11.0	94.0
Putnam	29.6	—	101.1	27.1	23.2	181.0
Ritchie	13.5	—	167.9	41.0	33.0	255.4
Roane	20.2	—	120.2	37.1	27.1	204.6
Tyler	7.2	—	85.2	21.5	16.7	130.6
Wayne	19.8	—	162.8	45.9	37.0	265.5
Wetzel	3.9	—	136.7	36.2	26.9	203.7
Wirt	29.7	—	81.4	22.8	20.4	154.3
Wood	32.5	—	93.0	25.9	22.0	173.4
Northwestern Unit	271.2	—	2,157.3	576.4	445.0	3,449.9
Total, State	430.2	334.5	7,722.1	3,705.5	1,323.1	13,515.4

Table 63.—*Net volume of sawtimber on commercial forest land in West Virginia, by forest type, county, and geographic unit, 1975*
(In millions of board feet) [a]

County	Virginia and pitch pine	Other softwood types	Oak-hickory	Maple-beech-birch	Other hardwood types	All types
Barbour	0.7	8.2	134.5	87.5	34.3	265.2
Berkeley	11.3	2.3	104.4	17.6	31.7	167.3
Braxton	1.4	21.8	284.3	186.9	66.2	560.6
Grant	35.4	3.6	232.7	56.1	73.9	401.7
Hampshire	29.4	5.8	329.0	41.0	102.7	507.9
Hardy	38.0	5.0	306.0	48.1	99.0	496.1
Harrison	.6	9.9	97.4	62.3	31.2	201.4
Jefferson	3.3	.5	21.1	3.8	7.0	35.7
Lewis	1.2	9.7	155.6	96.7	35.8	299.0
Mineral	26.3	2.4	149.7	28.1	53.8	260.3
Morgan	23.1	1.3	86.3	20.4	38.3	169.4
Pendleton	32.2	9.5	290.2	52.1	96.7	480.7
Pocahontas	2.6	256.8	438.0	949.9	109.5	1,756.8
Preston	1.9	18.6	324.3	209.1	72.1	626.0
Randolph	1.6	77.2	859.5	1,035.1	125.2	2,098.6
Taylor	.4	4.0	49.2	31.0	13.5	98.1
Tucker	.5	54.7	343.2	326.6	36.0	761.0
Upshur	.8	10.9	169.0	111.1	40.6	332.4
Webster	1.4	21.4	505.8	569.9	72.9	1,171.4
Northeastern Unit	212.1	523.6	4,880.2	3,933.3	1,140.4	10,689.6
Boone	—	9.2	424.8	206.0	17.8	657.8
Clay	3.4	11.9	311.7	113.6	29.2	469.8
Fayette	6.3	14.2	550.5	199.9	52.0	822.9
Greenbrier	8.1	53.8	792.1	583.7	109.9	1,547.6
Kanawha	10.3	31.6	746.5	271.2	71.6	1,131.2
Logan	—	11.4	390.2	150.8	21.9	574.3
McDowell	—	14.6	378.9	175.5	34.4	603.4
Mercer	2.8	9.4	332.2	122.5	32.8	499.7
Mingo	—	10.1	343.3	150.2	22.9	526.5
Monroe	11.1	13.5	237.7	83.0	21.6	366.9
Nicholas	7.3	11.7	506.4	306.8	43.5	875.7
Raleigh	5.4	9.2	492.3	177.9	47.3	732.1
Summers	3.3	10.4	271.4	98.7	26.9	410.7
Wyoming	9.1	48.4	391.4	143.9	36.7	629.5
Southern Unit	67.1	259.4	6,169.4	2,783.7	568.5	9,848.1
Brooke	1.8	—	30.0	9.4	6.1	47.3
Cabell	25.4	—	150.0	48.8	34.3	258.5
Calhoun	32.3	—	138.8	49.4	36.0	256.5
Doddridge	5.6	—	268.7	75.6	39.0	388.9
Gilmer	6.3	—	266.8	72.2	43.6	388.9
Hancock	1.9	—	30.2	12.2	6.4	50.7
Jackson	45.8	—	230.0	75.5	51.9	403.2
Lincoln	11.4	—	356.0	124.4	71.1	562.9
Marion	5.7	—	228.0	63.2	31.0	327.9
Marshall	7.2	—	129.4	50.0	28.1	214.7
Mason	62.6	—	175.6	55.7	43.6	337.5
Monongalia	6.5	—	260.9	73.0	40.0	380.4
Ohio	2.5	—	47.0	16.7	9.8	76.0
Pleasants	9.0	—	144.5	37.3	22.1	212.9

Continued

Table 63.—Continued

County	Virginia and pitch pine	Other softwood types	Oak-hickory	Maple-beech-birch	Other hardwood types	All types
Putnam	58.0	—	203.4	62.8	46.2	370.4
Ritchie	27.0	—	350.2	98.7	66.1	542.0
Roane	39.7	—	216.8	83.7	52.3	392.5
Tyler	13.7	—	174.1	52.1	32.6	272.5
Wayne	36.1	—	304.8	104.7	70.6	516.2
Wetzel	7.7	—	274.3	85.3	53.2	420.5
Wirt	60.0	—	164.4	52.7	41.4	318.5
Wood	64.4	—	186.0	60.1	43.7	354.2
Northwestern Unit	530.6	—	4,329.9	1,363.5	869.1	7,093.1
Total, State	809.8	783.0	15,379.5	8,080.5	2,578.0	27,630.8

[a] International 1/4-inch rule.

Table 64.—*Net volume of growing stock on commercial forest land in West Virginia, by species, county, and geographic unit, 1975*
(In millions of cubic feet)

County	Softwoods	Select oaks	Other hard hardwoods	Yellow-poplar	Other soft hardwoods	Total all species
Barbour	5.8	22.8	65.3	21.8	31.2	146.9
Berkeley	13.2	23.8	49.4	2.1	10.5	99.0
Braxton	13.3	47.4	131.7	42.0	61.5	295.9
Grant	33.9	54.3	112.7	3.5	30.6	235.0
Hampshire	38.0	73.7	149.2	6.1	31.7	298.7
Hardy	38.4	70.5	144.7	5.6	31.8	291.0
Harrison	5.7	16.8	50.7	20.0	26.7	119.9
Jefferson	3.0	5.3	10.8	0.5	2.4	22.0
Lewis	7.6	25.1	74.9	27.9	36.2	171.7
Mineral	22.8	36.7	76.0	2.6	17.1	155.2
Morgan	16.8	23.5	49.3	1.2	11.5	102.3
Pendleton	39.1	68.4	140.0	5.6	36.1	289.2
Pocahontas	89.0	133.2	387.5	43.9	204.2	857.8
Preston	14.7	52.9	150.8	51.7	71.5	341.6
Randolph	85.1	160.5	416.3	102.2	225.5	989.6
Taylor	2.7	8.2	24.8	9.6	12.5	57.8
Tucker	27.2	53.4	138.9	37.9	84.2	341.6
Upshur	7.3	28.5	79.7	25.1	37.2	177.8
Webster	15.2	82.5	218.0	74.0	126.3	516.0
Northeastern Unit	478.8	987.5	2,470.7	483.3	1,088.7	5,509.0

Continued

Table 64.—Continued

County	Softwoods	Select oaks	Other hard hardwoods	Yellow-poplar	Other soft hardwoods	Total all species
Boone	4.7	47.2	155.4	40.3	22.7	270.3
Clay	9.6	45.0	113.7	31.9	24.9	225.1
Fayette	13.9	79.5	200.4	55.9	43.3	393.0
Greenbrier	59.4	134.5	347.4	72.9	114.2	728.4
Kanawha	25.1	108.3	269.8	75.9	59.4	538.5
Logan	4.8	39.3	133.3	37.2	21.7	236.3
McDowell	6.2	48.6	140.9	41.7	22.1	259.5
Mercer	8.9	47.1	116.8	32.3	25.2	230.3
Mingo	4.5	38.1	124.5	33.9	18.9	219.9
Monroe	10.6	38.1	93.4	28.0	21.6	191.7
Nicholas	13.6	80.9	201.2	62.7	58.0	416.4
Raleigh	10.9	70.9	176.7	49.2	38.4	346.1
Summers	8.5	38.8	96.2	26.6	21.0	191.1
Wyoming	28.4	58.2	147.1	42.3	33.9	309.9
Southern Unit	209.1	874.5	2,316.8	630.8	525.3	4,556.5
Brooke	1.3	5.1	12.2	2.2	3.0	23.8
Cabell	14.4	26.3	62.9	12.1	15.8	131.5
Calhoun	17.9	25.1	62.1	12.3	15.4	132.8
Doddridge	6.4	40.1	94.8	14.8	20.0	176.1
Gilmer	7.2	41.0	95.6	15.7	21.4	180.9
Hancock	1.3	5.5	13.0	2.3	3.3	25.4
Jackson	23.6	40.6	96.1	17.3	23.9	201.5
Lincoln	12.7	61.5	142.2	24.9	35.5	276.8
Marion	5.5	33.5	80.2	12.6	16.2	148.0
Marshall	5.9	23.5	56.2	10.3	14.7	110.6
Mason	29.9	30.9	75.3	14.5	18.2	168.8
Monongalia	6.5	39.6	92.5	14.4	20.3	173.3
Ohio	1.9	8.3	19.3	3.4	5.0	37.9
Pleasants	5.7	21.4	49.2	7.2	10.5	94.0
Putnam	28.2	35.2	83.1	14.8	19.7	181.0
Ritchie	17.6	56.4	129.5	21.2	30.7	255.4
Roane	22.0	40.7	98.4	19.0	24.5	204.6
Tyler	9.1	28.2	66.4	11.5	15.4	130.6
Wayne	23.9	54.6	129.2	24.9	32.9	265.5
Wetzel	9.0	45.7	105.0	17.8	26.2	203.7
Wirt	27.5	29.4	69.4	11.5	16.5	154.3
Wood	29.6	32.5	78.6	14.0	18.7	173.4
Northwestern Unit	307.1	725.1	1,711.2	298.7	407.8	3,449.9
Total, State	995.0	2,587.1	6,498.7	1,412.8	2,021.8	13,515.4

Table 65.—*Net volume of sawtimber on commercial forest land in West Virginia, by species, county, and geographic unit, 1975*
(In millions of board feet) [a]

County	Softwoods	Select oaks	Other hard hardwoods	Yellow-poplar	Other soft hardwoods	Total all species
Barbour	16.0	50.1	109.7	43.9	45.5	265.2
Berkeley	27.8	46.8	71.0	4.2	17.5	167.3
Braxton	36.0	108.6	231.5	89.2	95.3	560.6
Grant	79.2	105.2	154.4	7.4	55.5	401.7
Hampshire	82.5	147.4	213.5	12.8	51.7	507.9
Hardy	85.9	140.1	203.1	11.8	55.2	496.1
Harrison	16.8	35.5	79.7	33.8	35.6	201.4
Jefferson	6.4	10.1	14.3	0.8	4.1	35.7
Lewis	21.1	54.4	120.3	53.3	49.9	299.0
Mineral	50.3	71.8	101.3	5.3	31.6	260.3
Morgan	37.9	44.9	61.4	2.6	22.6	169.4
Pendleton	84.3	132.9	192.8	11.8	58.9	480.7
Pocahontas	259.3	285.1	704.6	97.2	410.6	1,756.8
Preston	40.6	117.5	256.2	104.0	107.7	626.0
Randolph	237.4	369.7	806.8	232.3	452.4	2,098.6
Taylor	7.6	17.5	38.9	17.1	17.0	98.1
Tucker	104.8	122.0	247.2	119.8	167.2	761.0
Upshur	19.4	64.3	138.3	53.5	56.9	332.4
Webster	132.8	201.2	407.1	184.6	245.7	1,171.4
Northeastern Unit	1,346.1	2,125.1	4,152.1	1,085.4	1,980.9	10,689.6
Boone	9.8	112.1	372.2	118.7	45.0	657.8
Clay	26.8	109.1	220.4	72.4	41.1	469.8
Fayette	41.8	193.2	390.1	126.6	71.2	822.9
Greenbrier	147.6	324.3	682.5	169.3	223.9	1,547.6
Kanawha	66.2	267.0	526.8	172.9	98.3	1,131.2
Logan	9.4	91.2	325.2	104.2	44.3	574.3
McDowell	11.8	108.4	329.9	119.7	33.6	603.4
Mercer	25.2	120.2	236.3	75.4	42.6	499.7
Mingo	9.0	88.0	297.4	97.6	34.5	526.5
Monroe	25.2	86.2	163.3	58.9	33.3	366.9
Nicholas	47.4	190.8	384.7	148.9	103.9	875.7
Raleigh	34.3	175.5	347.8	111.8	62.7	732.1
Summers	22.7	98.3	193.0	61.8	34.9	410.7
Wyoming	60.1	139.3	277.4	95.9	56.8	629.5
Southern Unit	537.3	2,103.6	4,747.0	1,534.1	926.1	9,848.1
Brooke	3.0	11.3	23.0	4.6	5.4	47.3
Cabell	31.9	57.4	116.4	26.1	26.7	258.5
Calhoun	40.3	53.7	111.5	26.5	24.5	256.5
Doddridge	15.6	98.7	205.9	33.0	35.7	388.9
Gilmer	17.2	98.9	200.4	34.4	38.0	388.9
Hancock	3.4	11.5	24.6	4.8	6.4	50.7
Jackson	54.9	88.8	180.6	36.8	42.1	403.2
Lincoln	32.1	135.5	276.7	53.6	65.0	562.9
Marion	12.9	82.9	175.4	28.1	28.6	327.9
Marshall	14.5	49.3	103.1	21.6	26.2	214.7
Mason	66.7	67.9	141.2	31.6	30.1	337.5
Monongalia	16.2	96.2	199.0	32.2	36.8	380.4
Ohio	4.9	17.9	36.8	7.3	9.1	76.0
Pleasants	14.1	53.7	109.6	16.4	19.1	212.9

Continued

Table 65.—Continued

County	Softwoods	Select oaks	Other hard hardwoods	Yellow-poplar	Other soft hardwoods	Total all species
Putnam	64.1	78.8	160.7	32.1	34.7	370.4
Ritchie	42.4	132.5	264.8	46.8	55.5	542.0
Roane	50.6	83.9	175.2	39.8	43.0	392.5
Tyler	21.1	65.4	133.7	25.1	27.2	272.5
Wayne	53.2	117.0	236.8	53.0	56.2	516.2
Wetzel	22.4	103.9	208.3	38.6	47.3	420.5
Wirt	66.3	65.6	132.0	24.7	29.9	318.5
Wood	68.5	72.4	149.9	31.1	32.3	354.2
Northwestern Unit	716.3	1,643.2	3,365.6	648.2	719.8	7,093.1
Total, State	2,599.7	5,871.9	12,264.7	3,267.7	3,626.8	27,630.8

[a] International 1/4-inch rule.

The Author

JAMES T. BONES, research forester, received his bachelor's degree in soil conservation from Utah State University in 1952 and his master's degree in forest management from the same university in 1956. He worked at the Pacific Northwest Forest and Range Experiment Station and the Institute of Northern Forestry until 1965, when he became a United Nations forestry advisor to the Government of Colombia in South America. After his return in March 1968, he was transferred to the Northeastern Forest Experiment Station. He is now stationed in Broomall, Pa., where he is working in the timber removals phase of Forest Resources Evaluation.

MANUSCRIPT RECEIVED FOR PUBLICATION 2 NOVEMBER 1977

☆U.S. GOVERNMENT PRINTING OFFICE: 1978–703-112:33

Bones, James T.
1978. **The forest resources of West Virginia.** Northeast. For. Exp. Stn., Broomall, Pa.
105 p., illus. (U.S. Dep. Agric. For. Serv. Resour. Bull. NE-56)
A statistical and analytical report of the third forest survey of West Virginia by the Forest Service, U. S. Department of Agriculture. Findings are based on the remeasurement of 1/5-acre plots and new 10- point cluster plots. This report analyzes trends in forest land area, timber volume, annual growth, and timber removals. Timber products output by forest industries, based upon a canvass of industries in 1974, and the importance of timber and forests to the State's economy and environment are also discussed. The report includes a discussion of the outlook for timber supplies during the next 30 years, a discussion of resource management opportunities, and 65 tables of statistical data.
(754)--905.2
Keywords: Forest resources; timber inventory; timber growth; timber removal; trends; timber outlook; timber quality.

Bones, James T.
1978. **The forest resources of West Virginia.** Northeast. For. Exp. Stn., Broomall, Pa.
105 p., illus. (U.S. Dep. Agric. For. Serv. Resour. Bull. NE-56)
A statistical and analytical report of the third forest survey of West Virginia by the Forest Service, U. S. Department of Agriculture. Findings are based on the remeasurement of 1/5-acre plots and new 10- point cluster plots. This report analyzes trends in forest land area, timber volume, annual growth, and timber removals. Timber products output by forest industries, based upon a canvass of industries in 1974, and the importance of timber and forests to the State's economy and environment are also discussed. The report includes a discussion of the outlook for timber supplies during the next 30 years, a discussion of resource management opportunities, and 65 tables of statistical data.
(754)--905.2
Keywords: Forest resources; timber inventory; timber growth; timber removal; trends; timber outlook; timber quality.

Bones, James T.
1978. **The forest resources of West Virginia.** Northeast. For. Exp. Stn., Broomall, Pa.
105 p., illus. (U.S. Dep. Agric. For. Serv. Resour. Bull. NE-56)
A statistical and analytical report of the third forest survey of West Virginia by the Forest Service, U. S. Department of Agriculture. Findings are based on the remeasurement of 1/5-acre plots and new 10- point cluster plots. This report analyzes trends in forest land area, timber volume, annual growth, and timber removals. Timber products output by forest industries, based upon a canvass of industries in 1974, and the importance of timber and forests to the State's economy and environment are also discussed. The report includes a discussion of the outlook for timber supplies during the next 30 years, a discussion of resource management opportunities, and 65 tables of statistical data.
(754)--905.2
Keywords: Forest resources; timber inventory; timber growth; timber removal; trends; timber outlook; timber quality.

Bones, James T.
1978. **The forest resources of West Virginia.** Northeast. For. Exp. Stn., Broomall, Pa.
105 p., illus. (U.S. Dep. Agric. For. Serv. Resour. Bull. NE-56)
A statistical and analytical report of the third forest survey of West Virginia by the Forest Service, U. S. Department of Agriculture. Findings are based on the remeasurement of 1/5-acre plots and new 10- point cluster plots. This report analyzes trends in forest land area, timber volume, annual growth, and timber removals. Timber products output by forest industries, based upon a canvass of industries in 1974, and the importance of timber and forests to the State's economy and environment are also discussed. The report includes a discussion of the outlook for timber supplies during the next 30 years, a discussion of resource management opportunities, and 65 tables of statistical data.
(754)--905.2
Keywords: Forest resources; timber inventory; timber growth; timber removal; trends; timber outlook; timber quality.

Headquarters of the Northeastern Forest Experiment Station are in Broomall, Pa. Field laboratories and research units are maintained at:

- Beltsville, Maryland.
- Berea, Kentucky, in cooperation with Berea College.
- Burlington, Vermont, in cooperation with the University of Vermont.
- Delaware, Ohio.
- Durham, New Hampshire, in cooperation with the University of New Hampshire.
- Hamden, Connecticut, in cooperation with Yale University.
- Kingston, Pennsylvania.
- Morgantown, West Virginia, in cooperation with West Virginia University, Morgantown.
- Orono, Maine, in cooperation with the University of Maine, Orono.
- Parsons, West Virginia.
- Pennington, New Jersey.
- Princeton, West Virginia.
- Syracuse, New York, in cooperation with the State University of New York College of Environmental Sciences and Forestry at Syracuse University, Syracuse.
- Warren, Pennsylvania.

GOVT. DOCUMENTS
CLEMSON
LIBRARY

CLEMSON UNIVERSITY LIBRARY
MAR 5 1979
S.C. TECH. DIV.

THE FOREST-LAND OWNERS OF KENTUCKY

by Thomas W. Birch
and Douglas S. Powell

FOREST SERVICE RESOURCE BULLETIN NE-57
1978
FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE
NORTHEASTERN FOREST EXPERIMENT STATION
370 REED ROAD, BROOMALL, PA. 19008

THE AUTHORS

THOMAS W. BIRCH, research forester, received his Bachelor of Science degree from Michigan State University in 1969. He received his master's degree from Michigan State in March 1974. He joined the Northeastern Forest Experiment Station, Resources Evaluation Unit, in June 1974 as a resource analyst.

DOUGLAS S. POWELL, research forester, received his bachelor's degree in forestry from the University of Michigan in 1971 and his master's degree in forest ecology from West Virginia University in 1976. He joined the Northeastern Forest Experiment Station in July 1971, and is now a resource analyst in the Resources Evaluation Unit, Broomall, Pa.

Manuscript received for publication 17 January 1978

ABSTRACT

Ninety-two percent of the commercial forest land in Kentucky—11 million acres—is in the hands of some 455,600 private owners. Ninety-four percent of these owners are individuals. The "average" individual owner is in late middle age, has little formal education, receives a modest income, has a farm or rural background, has owned his woodland more than 10 years, and lives within 1 mile of his only wooded tract. Thirty percent of the owners, controlling 54 percent of the private woodland, have harvested timber previously. Forty-seven percent of the owners intend to harvest in the future. These owners control 71 percent of the privately held commercial forest land in Kentucky. Most owners show little interest in forestry and only a scant knowledge of sound forestry practices. In fact, only 5 percent of the Kentucky owners have ever received forestry assistance, and majority of owners do not know who to contact for such assistance. Thirty-nine percent of the owners permit public use of this land.

COVER PHOTO: An aerial view in Morgan County, Kentucky

THE FOREST-LAND OWNERS OF KENTUCKY

CONTENTS

INTRODUCTION 1
THE FOREST LAND AND ITS OWNERS 1
  The individual forest-land owner 3
  The corporate and other owners 4
WHY PEOPLE OWN FOREST LAND 6
HOW MUCH TIMBER IS AVAILABLE 7
OWNER ATTITUDES CONCERNING TIMBER HARVESTING 9
  Predicting owner behavior 9
  Why owners harvest timber 13
  Why some owners do not harvest timber 14
SOME ASPECTS OF LAND MANAGEMENT ON PRIVATE COMMERCIAL FOREST LAND 15
  Selection of timber for harvesting 15
  The products harvested 15
  Forestry assistance 15
  Public use 16
LANDOWNER INTERESTS 16
CONSERVATION QUIZ 16
CONCLUSIONS 19
LITERATURE CITED 20
APPENDIX 21
  Study method 21
  Sampling errors 22
  Questionnaire 23
  Definition of terms 35
  Metric equivalents of units used in this report 36
INDEX TO TABLES 36

HIGHLIGHTS

- Ninety-two percent of the commercial forest land in Kentucky—11 million acres—is in the hands of some 455,600 private owners.

- The average size of private woodland ownerships is 24.2 acres.

- Ninety-four percent of private owners are individuals.

- The average individual owner is in late middle age, has little formal education, receives a modest income, has a farm or rur background, has owned his wood land more than 10 years, an lives within 1 mile of his only wooded tract.

- Thirty percent of owners, who control 54 percent of the private woodland, have harvested timber previously.

- Forty-seven percent of the owners intend to harvest at some future date. They control 71 percent of the private woodland.

- Only 5 percent of the owners have received forestry assistance, and a majority of owners do not know who to contact for such assistance.

- Thirty-nine percent of owners permit public use of their woodland.

- Most owners show little interest in forestry and only a sca knowledge of sound forestry practices.

INTRODUCTION

THE MOST RECENT forest survey of Kentucky—1975—provided estimates of forest area and timber volume by broad owner categories (Kingsley and Powell 1978). That survey did not, however, estimate the timber volume or acreage of commercial forest land that is available for harvesting. The report also did not describe forest-land owners, their reasons for owning forest land, their attitudes toward timber harvesting, forest management, and the recreational use of their lands by the public.

Such information is useful to public agencies for planning and organizing forestry-related programs; to forest industries for locating available timber; and to others for learning more about the motivations and objectives of forest-land owners. Ninety-two percent of the commercial forest land in Kentucky is in private hands, and an in-depth look at the private forest-land owners will provide a better understanding of the forest resources of the State.

This report complements "The Forest Resources of Kentucky" (Kingsley and Powell 1978) by giving an overview of forest ownership in Kentucky. The data for this canvass were gathered from a sample of forest-land owners. The responses were statistically expanded to estimate the total population of private forest-land owners and the acreage that they own. *Users of this report are strongly advised to read carefully the definitions of terms and the discussion of study design and sampling errors included in the appendix.*

In this study the state has been divided into the same seven geographic sampling units used in the forest resources inventory. This permits regional comparisons with the inventory data as well as comparisons between regions in the State.

THE FORESTLAND AND ITS OWNERS

There are an estimated 455,600 owners of the 11 million acres of private commercial forest land in Kentucky. Figure 1 shows how these ownerships are distributed across the State by forest survey unit. The average private ownership is 24.2 acres

Figure 1. The relative distribution of private forest-land owners and private commercial forest land in the geographic units.

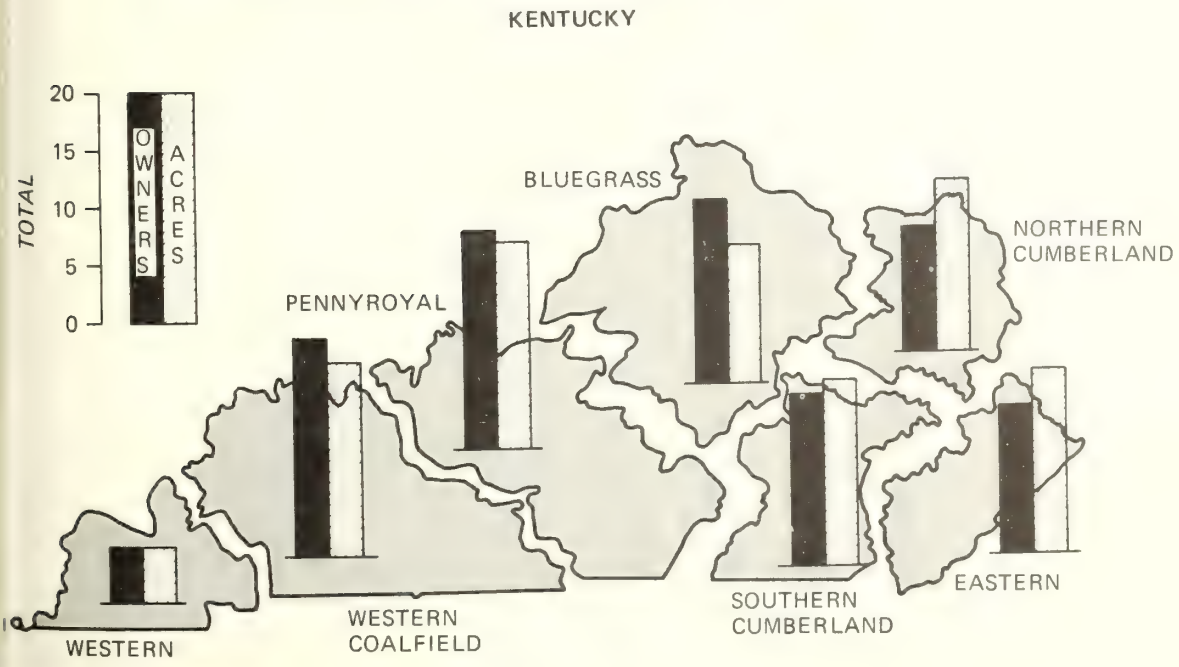


Figure 2. The average acreage of all forest-land ownerships and the average acreage of ownerships of 10 or more acres, by geographic units.

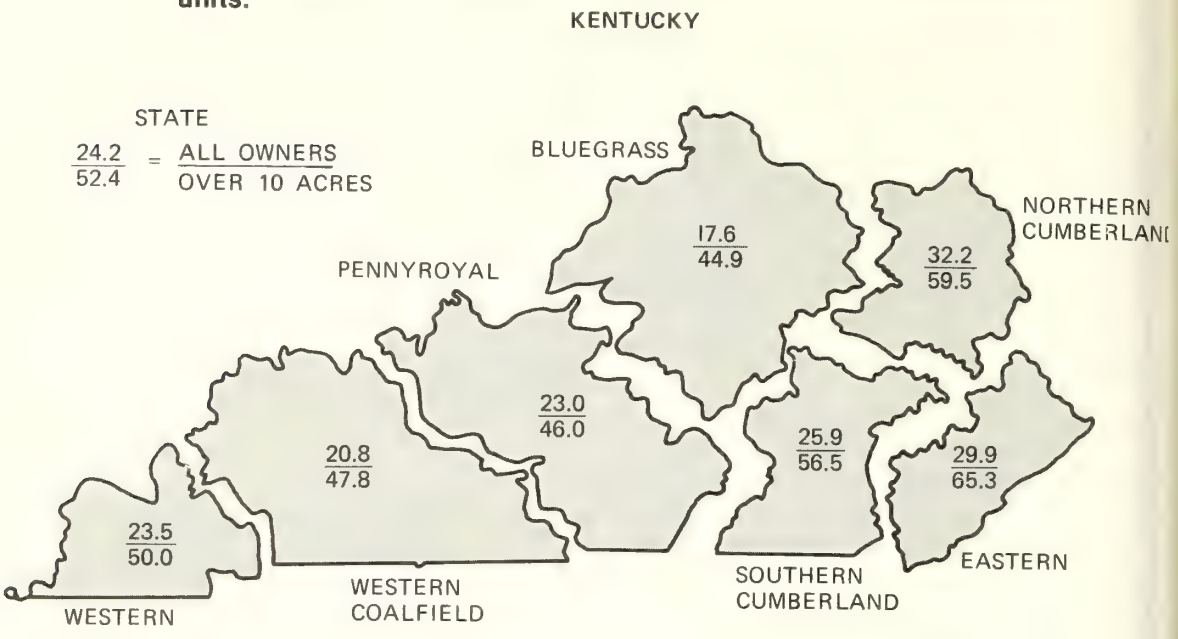


Figure 3. Distribution of private ownerships by size class of forest holding and by percentage of owners and acreage.

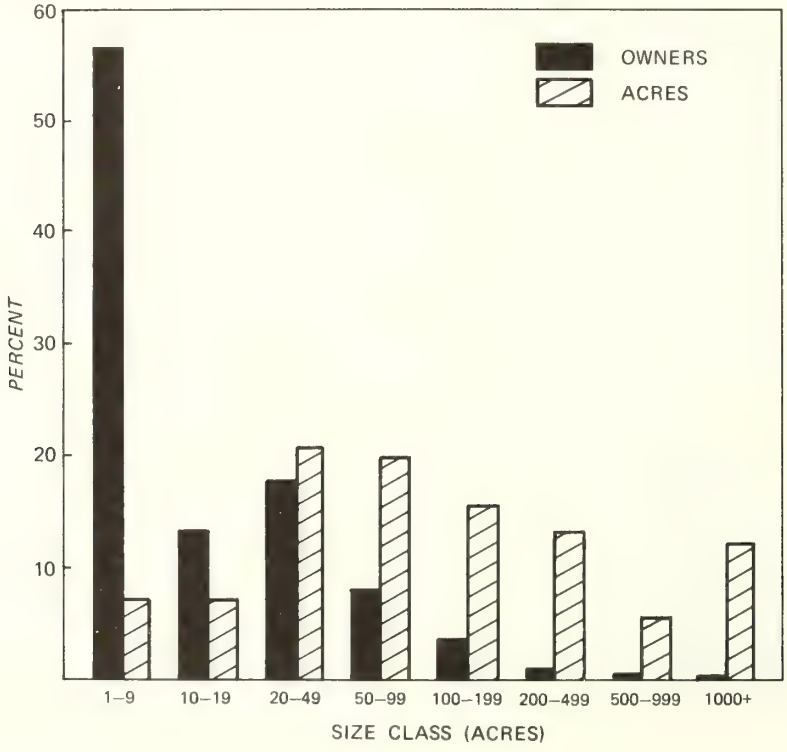
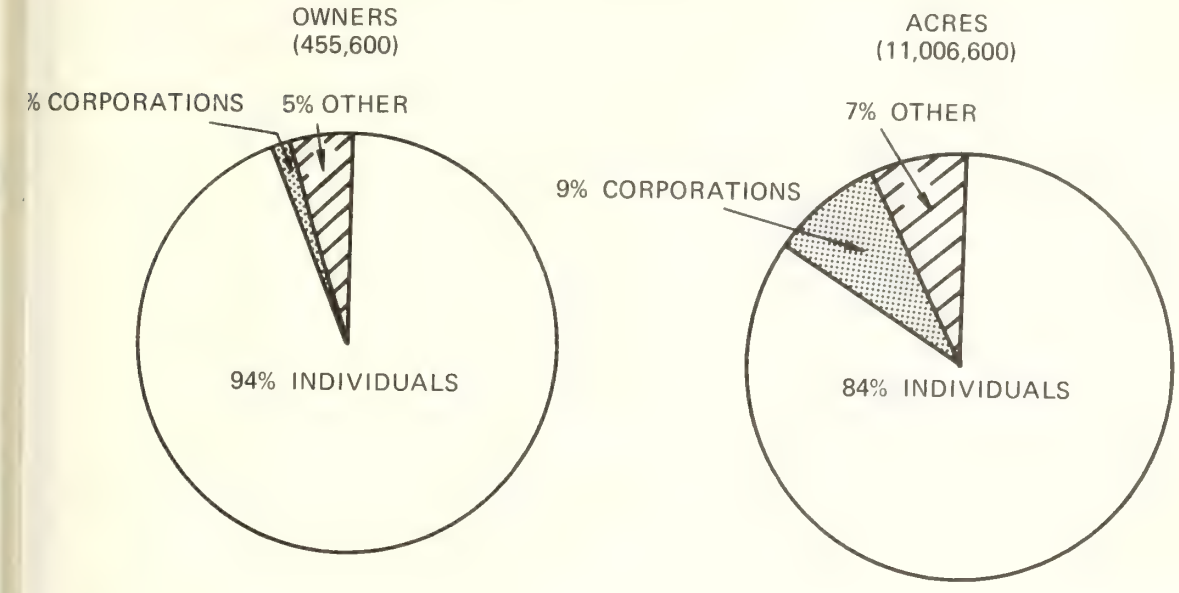


Figure 4. Percentage of all owners and acreage of privately owned commercial forest land by form of ownership.



f forest land including 1 acre ownerships. This igure rises to 52.4 acres when all ownerships of ewer than 10 acres are excluded (Fig. 2). While he ownerships range in size from 1 acre to over 00,000 acres, the largest group of owners—57 ercent—own fewer than 10 acres of commercial orest land. These ownerships account for only 7 ercent—805,900 acres—of the privately held ommercial forest land. Only 1 percent of the wners—6,100—have more than 200 acres of ommercial forest land, but they control 29 per- ent of the private commercial forest land, or 3.1 nillion acres. Figure 3 shows the number of wners and acreage owned by size class.

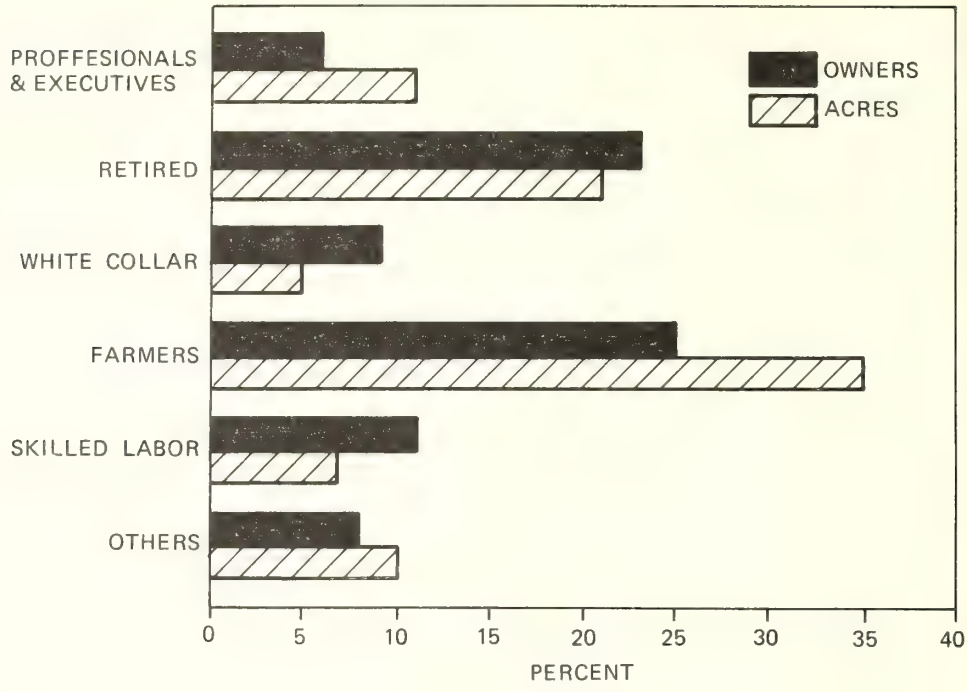
Individuals account for 427,200 owners—94 ercent—and 9.2 million acres—84 percent of the rivately owned commercial forest land (Fig. 4). There are an estimated 2,600 corporations that wn forest land in Kentucky—1 percent of all pri- ate owners—but they control over 1 million acres f commercial forest land. The remaining owners nclude partnerships, undivided estates, clubs, and ssociations.

The individual forest-land owner

Of the 427,200 individuals who own forest land in Kentucky, 107,600—25 percent—are farmers (Fig. 5). Farmers also hold more forest land than any other group of individual owners—3.1 million acres—35 percent of the total held by individuals. In the Bluegrass Unit, a region famous for horses and tobacco farms, farmers account for 38 percent of the individual owners and they hold 577,200 acres—almost half of the forest land owned by individuals. At the other extreme, in the Eastern Unit, a major coal producing region, farmers account for only 5 percent of the individual owners and they hold only 10 percent of the land held by individuals. In this unit, skilled workers far outnumber farmers with 35 percent, although they hold only 8 percent of the land held by individuals.

Retired persons rank just behind farmers, accounting for 23 percent of the individual forest-land owners in Kentucky. In the Western Unit, 53 percent of the individuals who own forest land are

Figure 5. Owner occupations by percentage of owners and acreage.



retired. Retired people constitute a significant block of owners in each of the seven geographic units. In the State as a whole, retired people own nearly 2 million acres of commercial forest land. Many of these owners are retired farmers who have leased or sold their cropland.

Other significant groups of owners in Kentucky are skilled laborers, white-collar workers, professionals, executives, and housewives. These five groups account for 30 percent of the individual owners and they own 27 percent of the commercial forest land held by individuals.

Other information provides us with a general description of the typical individual owners of commercial forest land in Kentucky (Fig. 6). Thirty-three percent are in the 45- to 64-year-old age group, but 28 percent are 65 or older. Forty-five percent had fewer than 9 years of schooling and 22 percent had between 9 and 12 years. Forty-five percent had annual incomes of less than $10,000 and 17 percent had incomes between $10,000 and $14,999. Fifty-two percent lived on a farm during the first 12 years of their lives and another 20 percent grew up in rural areas. Fifty-four percent had owned their woodland from 5 to 49 years. Of these owners: 10 percent owned their land from 5 to 9 years; 23 percent, 10 to 24 years; and 21 percent, 25 to 49 years. Most owners ow only one tract which is part of their farm or resi dence. Seventy-one percent live on the same trac or within 1 mile of it. Though such generalization should be used cautiously, we might typify th average individual owner as being middle aged t elderly, having received comparatively littl formal education, having a modest income growing up on a farm or in the country, ownin his woodland for at least 10 years, and living on o within 1 mile of his only tract of commercial fores land.

The corporate and other owners

Corporations of one kind or another ow 1,023,900 acres of commercial forest land i Kentucky—less than 9 percent of the commerci forest land in the State. Of the 2,600 corporatio that own forest land, 1,000 are classed nonforest industries. These corporations hol 602,900 acres or 59 percent of the commerci forest land held by corporations. Many of the companies are engaged in coal, gas, petroleum, mineral extraction. Not surprisingly, the Easte Unit in the heart of the eastern coalfield, has t highest proportion of its commercial forest land corporate ownership—25 percent. Second highe

Figure 6. Profile of individual owning commercial forest land, by geographic unit.

Description	Eastern	Northern Cumberland	Southern Cumberland	Bluegrass	Pennyroyal	Western Coalfield	Western	State
Average acreage of ownership	22.5	29.2	24.4	16.0	22.7	18.1	20.0	21.5
Most commonly mentioned occupation	Skilled laborer	Retired	Retired	Farmer	Retired	Farmer	Retired	Farmer
Age	25-64	*	≥45	45-64	≥45	≥45	≥65	≥45
Education (years)	0-12	*	0-8	0-4 college	0-8	0-12	0-12	0-12
Income	<$10,000	*	<$10,000	<$15,000	<$15,000	<$15,000	<$10,000	<$15,000
Early environment	Farm or rural area	*	Farm or rural area	Farm or rural area	Farm	Farm	Farm	Farm
Period of ownership (years)	<25	5-49	5-49	5-24	≥10	≥10	≥10	5-49
Distance from residence to nearest tract	<1 mile	<1 mile	<1 mile	<1 mile	<1 mile	<1 mile	<1 mile	<1 mile
Number of tracts	one	one	one	one	one	one	one	one
Most commonly mentioned reason for owning	Part of residence	Part of residence	Part of residence	Part of residence	Part of farm	Part of farm	Part of farm	Part of farm

*Nonresponse precludes generalization.

is the Western Coalfield Unit, with 12 percent of its commercial forest land in corporate hands.

Corporate forest industries, while they number only 100, hold 170,900 acres or 17 percent of the commercial forest land held by corporations. The other 1,500 corporations in Kentucky hold an average of 167 acres. These include real estate corporations, corporate farms, and various other nonindustrial corporations.

Undivided estates constitute 16,300 ownerships—an unusually high proportion in Kentucky, particularly in the three eastern geographic units. In the Eastern Unit, undivided estates account for 11 percent of the ownerships, and in the Southern Cumberland Unit they account for 7 percent. Apparently in the Appalachian Highlands, an unusually large number of owners die intestate leaving the disposition of their land undecided for a long period of time.

The remaining ownerships in Kentucky consist of 8,400 partnerships and 1,100 clubs, trusts, associations, and similar groups. Together, these 9,500 ownerships hold 304,100 acres.

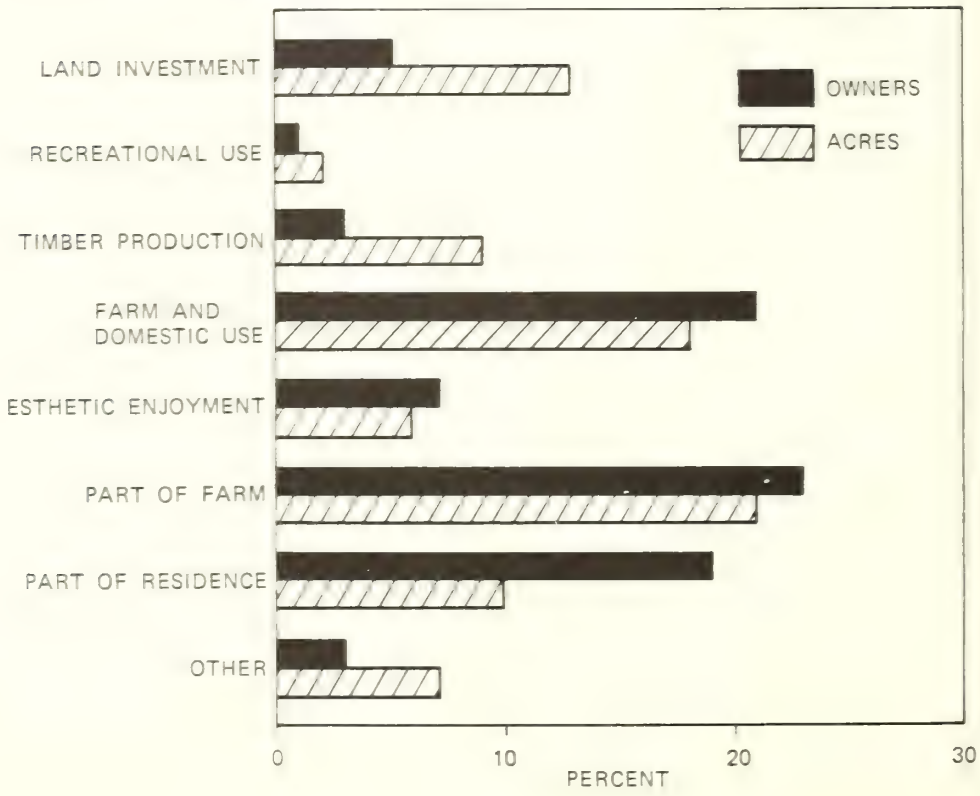
WHY PEOPLE OWN FOREST LAND

Nearly one out of every four owners hol forest land primarily because it is part of his far (Fig. 7). Another 19 percent said that they hel forest land because it was part of their residenc Together, these two groups hold nearly one-thil of the privately owned commercial forest land Kentucky. In contrast, only 3 percent of t owners in the State report that their primary re son for holding forest land is for timber produ tion. These owners hold 9 percent of the private held commercial forest land in Kentucky—few than 1 million acres.

The large number of owners who hold fore land simply because it is part of their farm or re dence is significant because it indicates that th have no firm objective in mind. Thus, they seldo actively manage their land for any purpose.

Twenty-one percent of the owners said they he forest land primarily for farm or domestic us These owners hold 18 percent of the private

Figure 7. Primary reason for owning forest land, by percentage of owners and acreage.



owned commercial forest land in the State. Farm or domestic use means that these owners consider their woodlands as a source of fence posts, fuelwood, and similar products for their own consumption.

Few Kentucky forest-land owners hold the land as an investment. Only 5 percent of the owners hold land for this reason, and they hold 13 percent of the privately held commercial forest land.

In addition to their reason for owning forest land, we also asked the respondents what benefit they had derived from their land during the past 5 years and what benefit they expected to derive in the coming 5 years. Farm or domestic use was by far the most frequent answer for both.

Thirty-five percent of the owners considered farm and domestic use the most important benefit they derived in the past 5 years, and 36 percent anticipate that it will be the most important in the coming 5 years. These owners control 25 percent of the private commercial forest land in Kentucky. Esthetic enjoyment was considered the second most common benefit, with 20 percent considering it the most important past benefit and 18 percent expecting it to be the most important future benefit. Benefits derived from recreational use, sale of timber, land value increase, and "other" reasons considered important by the holders, each account for less than 10 percent of the owners. However, those owners who indicated increase of land value or sale of timber as important benefits own substantially more land on average than most owners.

From the response received to both the reason for owning forest and benefits derived from it, it would appear that few Kentuckians look at their forest land as a source of financial gain. Rather, they perceive it as a part of their environment to be used as needed, but not manipulated for greater productivity either materially or financially. To many, the land—forested or not—is part of their heritage. Just to own it is satisfaction enough.

HOW MUCH TIMBER IS AVAILABLE

How much of the timber on privately owned forest land is available for harvesting? This question is persistently asked, and it is difficult to answer. The answer is influenced by how one defines availability and by the assumptions that are used to develop the estimate. Further, the usefulness of any estimate is limited to the time in which it is made. Industrial developments, market conditions, and other social and economic changes can drastically alter the interaction of the factors used to determine how much timber could be brought to market. We can, however, get an idea of how much timber might be available by examining the past practices of owners and their future intentions.

It is interesting to note that 30 percent of the present forest-land owners in Kentucky have harvested their timber at one time or another. But 47 percent say that they intend to harvest sometime in the future. Several questions come to mind. Does the 17 percent difference represent those owners who desire to harvest but will be unable to for lack of a market, insufficient volume, too small a tract? Does it represent those owners who do not sell because they place restrictions on the harvesting operations? Does it represent, owners who may have an unrealistic idea of the value of their timber? Does it represent the practice of harvesting timber just before selling the land? Or, does it represent those situations where the land is tied up in an estate and the heirs cannot agree on a timber harvest? We suspect that the 17 percent is made up of all these situations and more.

For these reasons and more, an owner may not harvest his timber even though he says that he intends to do so. Thus, it would seem wise to be skeptical about what owners say they intend to do, and to look at what they have done. Somewhere between the two is the realistic answer to the question of how much timber is available from private forest land in Kentucky.

The 135,900 forest-land owners (30 percent) who have harvested timber hold 5,970,600 acres of commercial forest land. Of these owners, an estimated 14,100 harvested timber in 1975. This harvesting entailed only 24 percent of the land they own. On average, only 280 ft^3 of growing stock for timber products was harvested from each acre involved. Multiplying this per acre volume by the 277,000 acres harvested, we estimate that these owners harvested 77.6 million ft^3 for products in 1975. It is interesting to note that by applying the percent of commercial forest land in the State that was privately owned in 1975—92.5—to the volume removed from growing stock for all products for that year, 94.3 million ft^3 (Kingsley and Powell 1978), we estimate that 87.2 million ft^3 were harvested for products from pri-

Figure 8. Volume of timber and area of commercial forest land available for harvesting timber products, by geographic units.

Item	Eastern	Northern Cumberland	Southern Cumberland	Bluegrass	Pennyroyal	Western Coalfield	Western	All units
Total private commercial forest land (M acres)	1,801	1,744	1,738	1,309	2,025	1,819	571	11,007
Private commercial forest land held by owners planning to harvest (M acres)	1,152	1,062	1,219	900	1,573	1,437	450	7,793
Percent of area that above owners consider available for harvesting	93	88	88	79	88	89	92	88
Area of commercial forest land available for harvesting (M acres)	1,067	937	1,082	712	1,382	1,279	416	6,875
Average annual net growth (ft^3/acre)	30.9	33.1	28.0	20.2	37.6	41.8	39.0	32.1
Estimated volume of net annual growth available for harvesting (million ft^3)	32,957	31,014	30,293	14,380	51,957	53,452	16,236	230,289
Estimated total removals from private commercial forest land in 1974 (million ft^3)	8,309	18,236	20,928	8,351	26,769	41,417	13,875	137,885

vate commercial forest land in 1974. This is 12 percent above our estimate for 1975.

A total of 51,400 owners of private forest land in Kentucky expect to harvest timber from their land within the next 10 years. In addition, 163,500 expect to harvest, but are not able to specify when. Together, these owners hold nearly 7.8 million acres of commercial forest land. With this information, we can begin to develop a reasonable estimate of the maximum volume of timber that could be harvested on a sustained annual basis.

Private forest-land owners, like public-land managers, do not consider that all of the land they own or administer is available for timber harvesting. We found that those owners who had harvested considered that, on average, 88 percent of their forest land was available for harvesting. If we assume, then that 88 percent of the land held by those owners who indicate a desire to harvest timber is available, we have 6.9 million acres of privately owned commercial forest land that we might consider as the timber-producing land base.

Privately owned forest land in Kentucky grows an average of 32.1 ft^3 per acre per year. At present levels of forest management, it should be possible to harvest an average of 32.1 ft^3 per acre per year from the 6.9 million acre land base. Thus, in theory, if all those Kentucky forest-land owners who intend to harvest have only the growth removed from their land, they could conceivably supply a total of 230.3 million ft^3 annually.

Figure 8 shows the estimated volume of timber available in each of the seven geographic units. Note that in each unit, more volume is considered available annually than was estimated to have been removed in 1974. The estimated volume removed in 1974 included the volume removed but not used for timber products. In fact, only about two-thirds of the volume of growing stock removed from Kentucky's forest land is used for timber products. The remaining volume is composed of removals for land clearing and land use changes, or logging residues.

It is clear, that if all of those owners who express an interest in harvesting timber harvested the annual growth from their lands, the output of timber products in Kentucky could be increased substantially and could be sustained at these higher levels. And, if a higher proportion of all timber removals were put into products, a higher rate of return for forest land could be realized. Also, increased levels of forest management on private forest land in Kentucky would further increase the volume of wood available annually.

OWNER ATTITUDES CONCERNING TIMBER HARVESTING

Predicting owner behavior

Who are the owners who plan to harvest timber? Are certain owners more likely to harvest? Do they have anything in common that might be used as a basis to predict owner behavior? Previous studies (Kingsley 1976, Kingsley and Birch 1977, Birch and Kingsley 1978) point to three things that characterize potential timber harvesters: similarity of primary benefits expected in the next 5 years, the size of their forest ownership, and their primary reason for owning woodland.

The highest percentage of owners with definite plans to harvest within 10 years—60 percent—gave income from the sale of timber as the primary benefit expected (Fig. 9). If we look at owners who have both definite and indefinite intentions to harvest, then at least 50 percent of those owners who expect benefits from increased land value or from esthetic enjoyment will also expect to harvest timber. Generally, owners whose primary expected benefit is esthetic enjoyment of their land are not considered to be potential harvesters—but this is apparently not so in Kentucky. Those owners who expect to use their woodlands for farm or domestic purposes are about evenly split between those who intend to harvest and those who do not.

After expected benefits, it appears that the size of forest ownership is the best predictor of an owner's intention to harvest timber. As size of ownership increases so does the proportion of owners who intend to harvest (Fig. 10). However, in no size class do more than 50 percent of the owners have definite harvesting plans.

The owner's primary reason for holding forest land is the third factor used to predict harvesting intentions (Fig. 11). As in size class of ownership, in no category do 50 percent or more of the owners have intentions to harvest in the coming 10 years. When we include those owners with definite harvesting intentions, people who own land for investment, recreational use, timber production, farm or domestic use, or because it is part of the farm, are more likely to plan on harvesting.

Figure 9. Percentage of owners and acreage owned by expected time of harvest and primary benefit expected in the next 5 years.

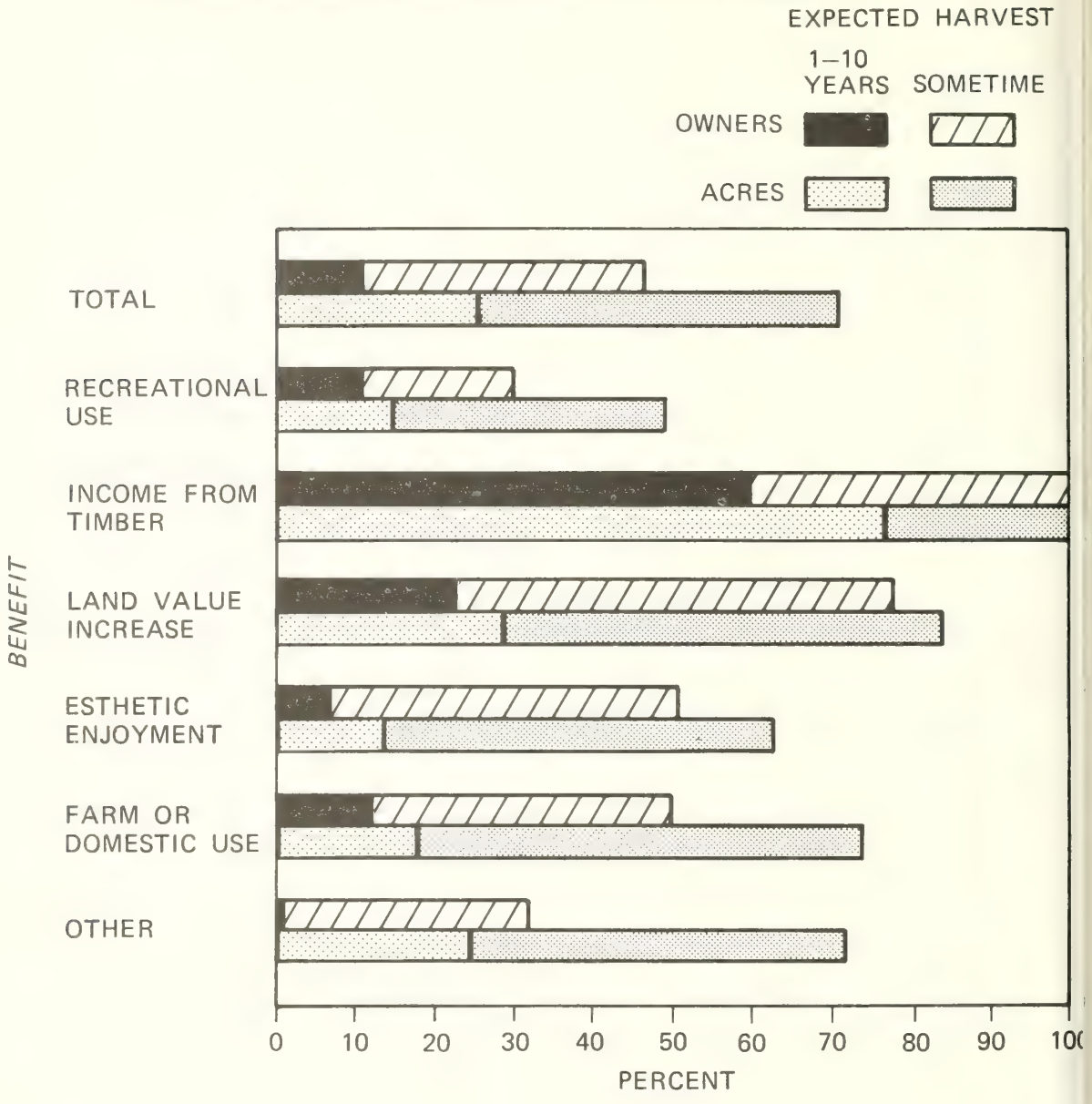


Figure 10. Percentage of owners by expected time of harvest and acreage owned and size class (in acres) of ownership.

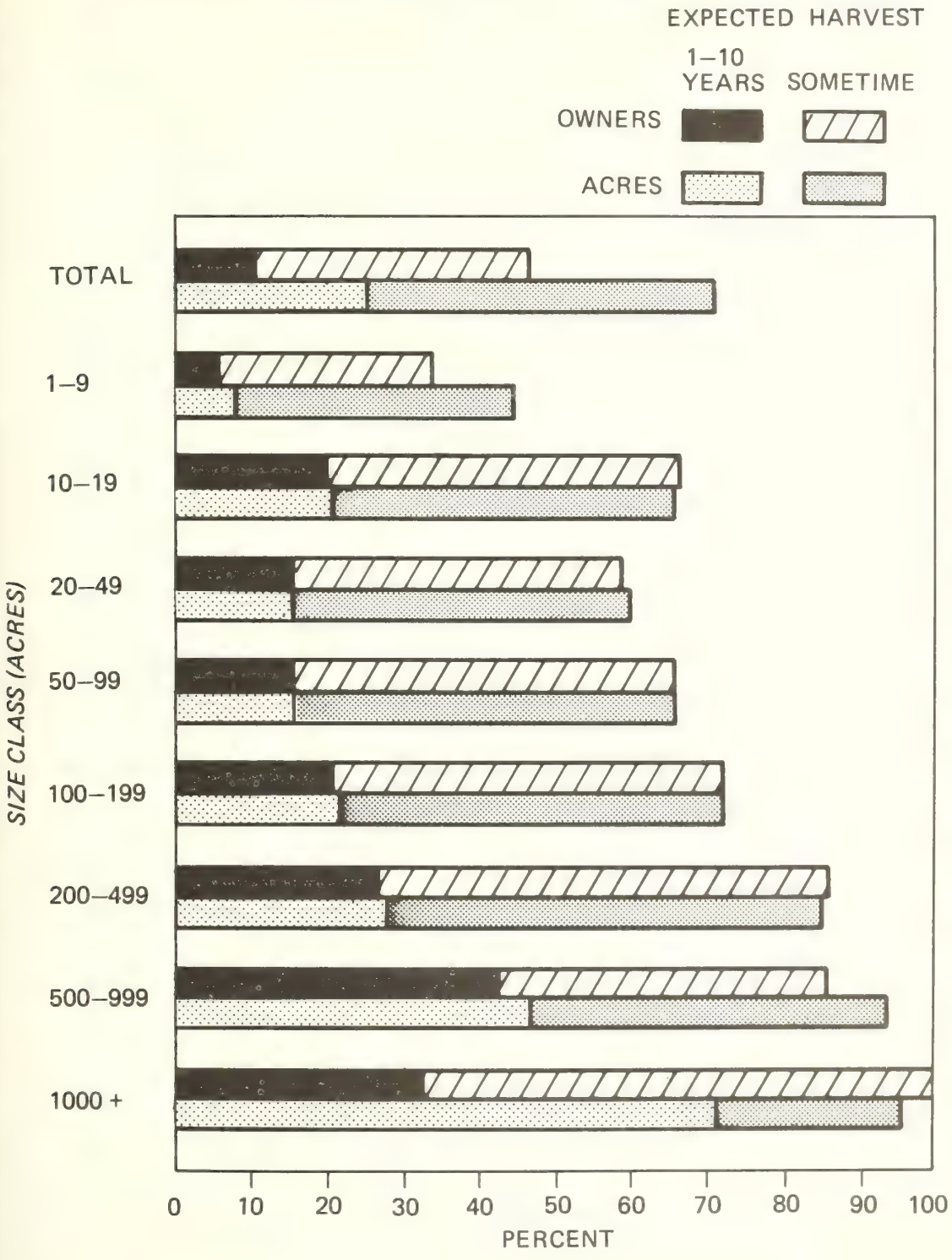
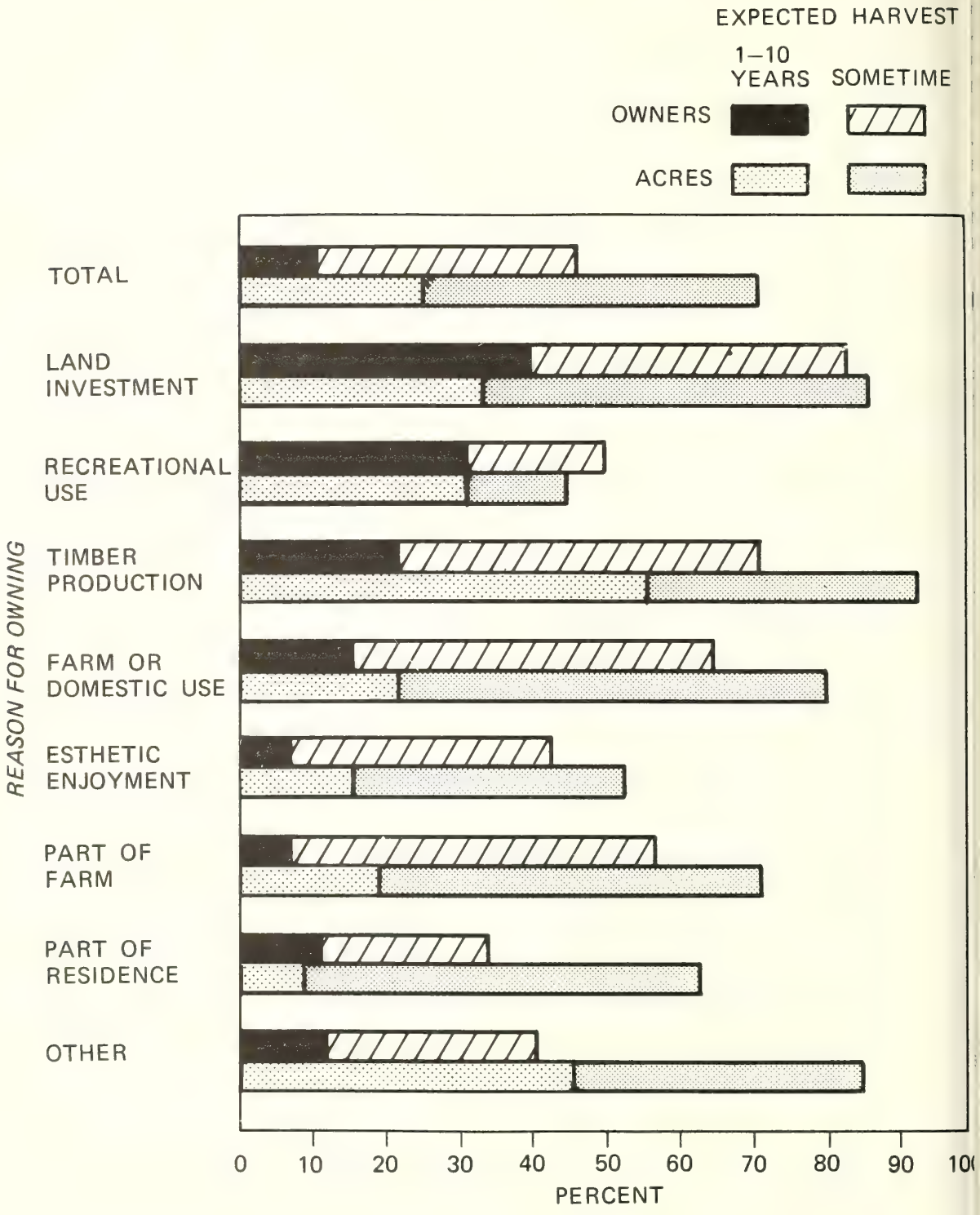


Figure 11. Percentage of owners and acreage owned by expected time of harvest and primary reason for owning forest land.



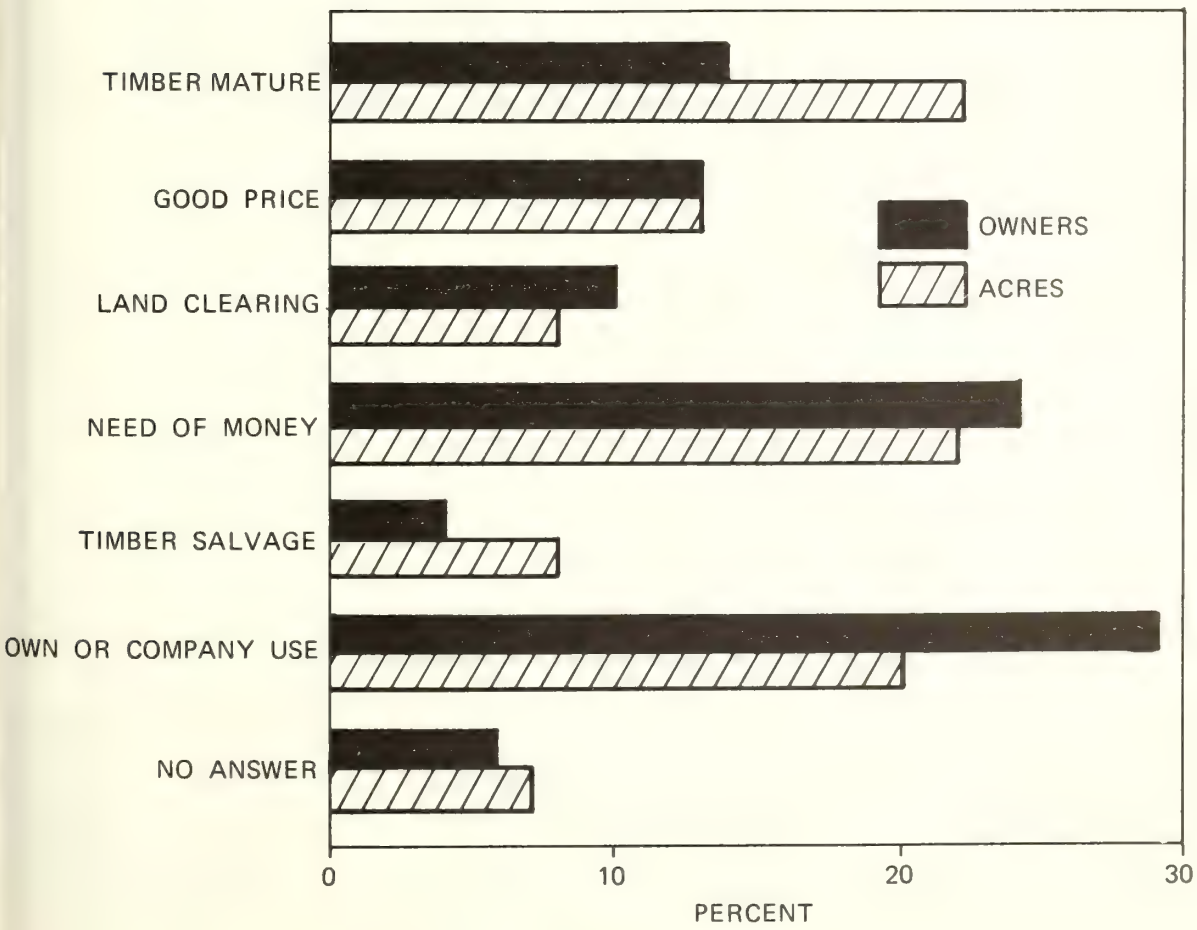
It should be noted that some owners who own orest land for timber production never intend to iarvest it. This seeming contradiction is possible, or instance, in situations where the owner is interested in timber production but realizes that vhen his land is ready for the next harvest he will iot own the land.

When we look at all three variables used to predict owner behavior, the intent to harvest is associated with them for quite a few owners. It appears hat potential harvesters of Kentucky timber epresent a rather broad cross section of the private forest-land owners of the State.

Why owners harvest timber

In Kentucky, 135,900 owners of private woodland have harvested timber. These owners hold 54 percent of the private commercial forest land —5,970,600 acres. Twenty-nine percent of these have harvested timber for their own or company use, though they own only 20 percent of the woodland owned by harvesters (Fig. 12). Much of this acreage belongs to forest industries that hold timber for their own use. Owners who harvested because they need money accounted for 24 percent of the harvesters and they hold 22 percent of the land. Mature timber was mentioned next most often by owners who have harvested—14 percent—but these ownerships account for 22 percent of the harvested private land. This is not unexpected because the timber industry of Kentucky is sawlog-oriented, and the more mature the timber is, the better sawlog product it will produce. It is interesting to note that land clearing, the reason that 91 percent of the corporations harvested (generally coal companies that cut prior to strip mining), is relatively insignificant on a statewide basis. This

Figure 12. Percent of owners who have harvested and acres of commercial forest land owned, by reason for harvesting.



might be expected since the area of commercial forest land has been slowly increasing since 1949 (Kingsley and Powell 1978).

Why some owners do not harvest timber

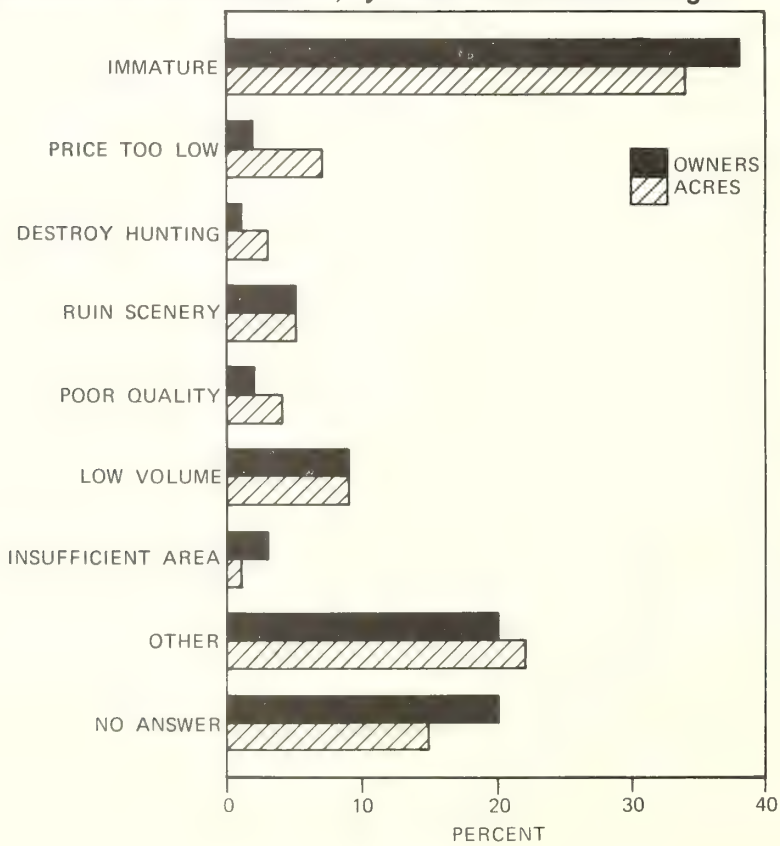
Seventy percent—319,700—of the private owners of Kentucky woodland have not harvested timber from their 5 million acres of commercial forest land. Their average holding of 15.8 acres is slightly over one-third of the average holding of owners who have harvested (43.9 acres). This reinforces the point that owners with larger tracts of land are more likely to harvest than are owners with smaller tracts.

Immature timber was the most frequent reason given for not harvesting (Fig. 13). Thirty-eight percent of nonharvesters owning 1.7 million acres of forest land would give this reason. We feel that most of these owners will be agreeable to harvesting once their timber reaches maturity. These owners make up nearly all of the nonharvesters who say that they intend to harvest.

Low volume was the next most often mentioned reason for not harvesting, accounting for both 9 percent of these owners and 9 percent of their land. This is another reason that does not preclude future harvests. Response by the remaining nonharvesters was rather evenly distributed over a dozen other reasons.

The other reasons included too low a price for timber, poor timber quality, low volume, insufficient area of forested land, and that cutting would destroy hunting or ruin scenery. Each reason accounted for less than 10 percent of the nonharvesting owners. From this, it would appear that few Kentucky forest-land owners are rigidly opposed to harvesting timber.

Figure 13. Percent of owners who have not harvested and acres of commercial forest land owned, by reason for not harvesting.



SOME ASPECTS OF LAND MANAGEMENT ON PRIVATE COMMERCIAL FOREST LAND

Selection of timber for harvesting

A majority of owners who have harvested timber—51 percent—stated that they were the ones who decided which area would be cut or how trees would be chosen for harvest. These owners control 2.9 million acres or 48 percent of the privately owned woodland on which harvesting took place. The next most frequent person to choose the timber on private woodlands was the actual buyer—30 percent of the owners who have harvested apparently allowed the buyer to take what he wanted.

As to the method of selection, 31 percent of the owners reported that their timber was harvested according to diameter limit. These owners account for 34 percent of the area held by those who harvest. In Kentucky, the use of the term diameter limit frequently means a minimum stump diameter as opposed to a minimum diameter at breast height. Thus, the method affords a convenient check on the timber operator. Individual-tree selection was the next most commonly used method, accounting for 16 percent of the owners and 17 percent of the land held. The third was land clearing, accounting for 10 percent of the owners and 8 percent of the land. Much of this land clearing was probably for farm fields and pastures.

Private landowners seldom employed foresters for timber selection. However, those who did—1 percent—hold 7 percent of the harvested woodland with an average ownership of 203 acres. It is interesting to note that the Kentucky Division of Forestry reports that the average acreage held by owners for whom they have marked timber is about 40 acres (personal correspondence with C. J. Lohr). The discrepancy between our estimate and the Kentucky Division of Forestry data may be because the largest owners in the State employ foresters on their staffs or use the services of private consulting foresters.

The products harvested

Sawlogs were by far the most common single product cut from private commercial forest land in Kentucky. Fifty-four percent of the harvesters said sawlogs were all that they cut on their 3.2 million acres of commercial forest land. This is not surprising since the volume of sawlogs accounts for nearly three-fourths of the total harvest of Kentucky (Bones and Lohr 1977).

The next most common single product was veneer material. Six percent of the harvesters said this was their only product. Pulpwood was mentioned by 1 percent of the harvesters as being the product cut from their woodland. This was somewhat surprising since pulpwood accounts for 12 percent of the total volume of industrial roundwood harvested in the State (Bones and Lohr 1977).

Many owners who have cut timber—25 percent owning 1.7 million acres of commercial forest land—harvested a number of different products. The number of products ranged from two to four or more and included sawlogs, veneer logs, pulpwood, cooperage logs, posts, poles, and pilings. This indicates that many owners are interested in making the best use of the timber on their woodlands.

Forestry assistance

When asked what office, agency, or individual they would contact for forestry assistance, 18 percent of the private forest-land owners would reply county or state. Of the owners who knew of someone to contact, this was the most common response. However, the majority of owners do not know who to contact.

It is generally agreed that the future demands for timber will have to be met by increasing production in privately owned lands. Yet at present, state service foresters in Kentucky, as elsewhere, are having difficuly meeting requests for assistance promptly. Thus, if forest-land owners are to be encouraged to seek assistance, larger staffs of professional foresters will be needed to meet the increased demand.

Twenty-three thousand owners—5 percent—owning 1.8 million acres of private commercial forest land—16 percent—mentioned that they had received some form of forestry assistance. These owners received services primarily for planting, management plans, timber evaluation, timber marking, and timber stand improvement. Other less frequently received services included timber sales administration, insect and disease control, and surveying.

Public use

Thirty-nine percent of the owners—178,200—controlling 52 percent of the private commercial forest land—5.7 million acres—would permit some form of public use of their lands for recreation. Ranked in decreasing order of favor, the recreational activities include:

- hunting
- hiking
- picnicking
- fishing
- camping
- snowmobiling

More than 33 percent of Kentucky's private forest owners permit hunting on the 5,073,800 acres they control, and only 14 percent of Kentucky owners post their land. Those owners who post hold 2,086,800 acres or 19 percent of the private commercial forest land in the State. However, their is a substantial number of owners who control a large total acreage who neither post their land nor permit hunting or other recreational uses of their land. The reason for this is that in Kentucky, unlike most other states, an individual must have the written permission of the owner to use his land whether or not it is posted. Posting then becomes a way for the owner to say no before he is asked.

LANDOWNER INTERESTS

In an attempt to find out if private individuals who own forest land in Kentucky share any interests in conservation, we asked owners to check our list of such organizations or groups and indicate those that they were active members of. The results indicate that 331,900 or 78 percent of the individual owners are not members of any conservation group. These people own 6.6 million acres of commercial forest land. Only 6 percent listed groups that they were members of, and these were generally farm or sportsman-oriented organizations. This is not surprising since we have already seen that farmers and people interested in forest recreation are well represented as Kentucky forestland owners.

We also asked individual owners to check our list of conservation-oriented publications and to indicate those that they received. Once again, the highest percentage of them—54—said that they did not subscribe to any such publication. "Kentucky Farmer" was the next most common answer, with 75,900 individuals—or 18 percent—subscribing. These people own 2.5 million acres of commercial forest land or 27 percent of the individual total. "Field and Stream" was the next most popular periodical listed, with 24,000 subscribers—6 percent—owning 837,000 acres of woodland.

While membership in organizations and subscriptions to magazines do not necessarily depict landowner interests, they do allow us to draw some general conclusions. Only a minority of individual woodland owners appears to be interested enough in some sort of natural resource conservation to belong to a conservation organization and/or subscribe to a conservation periodical. Most of these people, being farmers, are primarily interested in conservation of farm-related resources, such as soil and water. A number of others are more concerned with the wildlife resource on their woodlands. Only a very few indicate interest in conserving and managing the timber resource on their lands. So, when any interest is expressed in natural resource conservation by individuals owning Kentucky woodland, it centers much more on the nontimber forest resources.

CONSERVATION QUIZ

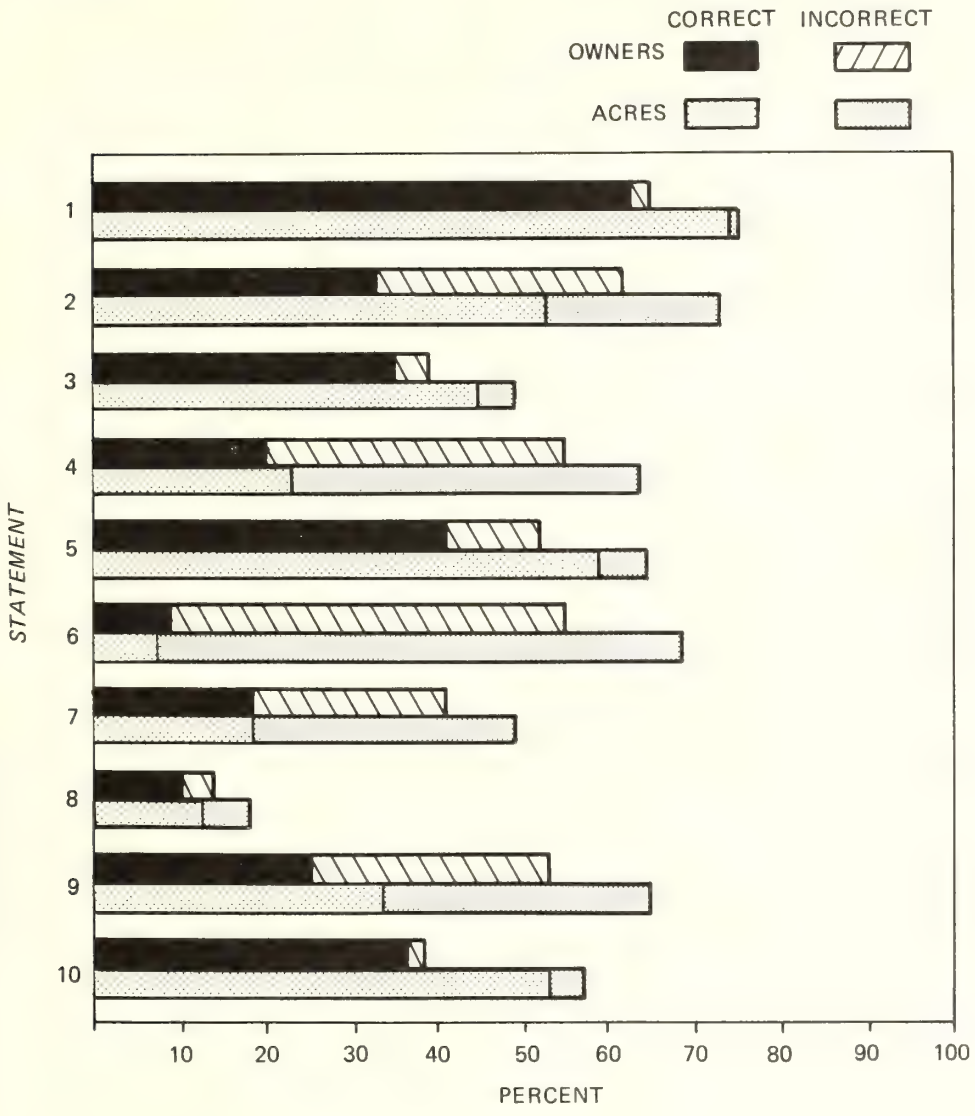
To learn how much individual owners of woodland know about conservation and forestry, we asked our respondents to indicate whether they thought 10 statements were true or false. We then estimated the responses for all individual owners in the State, and the percentages of the various responses are shown in Figure 14. The statements, the answers that professionals in these fields would give, and a discussion of the responses follow:

1. Conservation means that natural resources should be used wisely.
   Answer. True

This would be answered correctly by 63 percent of the individual owners, the highest correct response of all 10 questions. Only 11 percent would say they did not know the answer, the lowest of this response for all 10 questions. This indicates that most of them share a basic knowledge of what conservation is.

2. Once a forest is cut it will not grow back unless planted.
   Answer. False

Figure 14. Responses to true-false quiz by owners and acreage, in percent.



Only 33 percent would answer this correctly, nd 29 percent would answer incorrectly. This indicates that few owners realize that practically all f the current stands of timber in Kentucky grew ack naturally after the previous stands had been arvested. Very few stands have been regenerated y planting on commercial forest land in the State.

3. Sustained yield is an important forestry objective.
Answer. True

Only 35 percent would answer this correctly, but only 4 percent would say the statement is false. A great number will admit that they do not know, indicating that many people are not familiar with forestry objectives and terminology. Of those owners who attempted to answer the question, 90 percent answered correctly. See the appendix for the definition of sustained yield.

4. Clearcutting is always bad forestry.
Answer. False

Thirty-five percent would answer this incorrectly and 20 percent, correctly. This forestry practice has received much adverse publicity, and although it has been used incorrectly with detriment to the forest resources in some instances, when scientifically and properly applied, it is a sound and beneficial forestry tool. Since there appears to be much concern with nontimber forest resources, this may help to explain the response to this statement.

5. All forest land in the United States is managed.
   Answer. False

More people would reply to this correctly—41 percent—than to any statement except number 1. There appears to be an awareness of the lack of forest management among Kentucky woodland owners. Most of them have to look no further than their own woodland to answer this correctly.

6. Selective logging is always good forestry.
   Answer. False

This would be answered correctly only 9 percent of the time, and 46 percent of the people would believe this to be a true statement. More people answer this incorrectly than any other question. This is probably due to two things. One is that of all the logging methods used by the harvesters in Kentucky, diameter limit—considered a selective logging system by many Kentuckians—is the most commonly used. It is only natural that these people consider their harvesting practices as good forestry. Another is that many people view clearcutting as bad (see statement 4), so they reason that its opposite—selective logging—is good. Selective logging can often be good forestry. But in cases where clearcutting is the best practice to regenerate an entire stand, selective logging would likely be a poor forestry practice.

7. Commercial forest land is forest land that is owned by wood-using industries.
   Answer. False

As for statement 4, more people—23 percent—would answer this incorrectly than correctly—18 percent. This is not surprising since the term is used primarily by the Forest Service, and it is not expected that many private individuals are familiar with it. See the appendix for the definition of commercial forest land.

8. An ecosystem is any complex of living organ isms together with their environment that i isolated for study.
   Answer. True

While more people would answer true—10 per cent—than false—4 percent, an overwhelmin majority of the people would admit that the don't know the correct answer. This is a rather sci entific definition, and so it is not surprising to fin that most of the individual owners are unfamilia with this term.

9. A virgin forest is any forest of old or larg trees.
   Answer. False

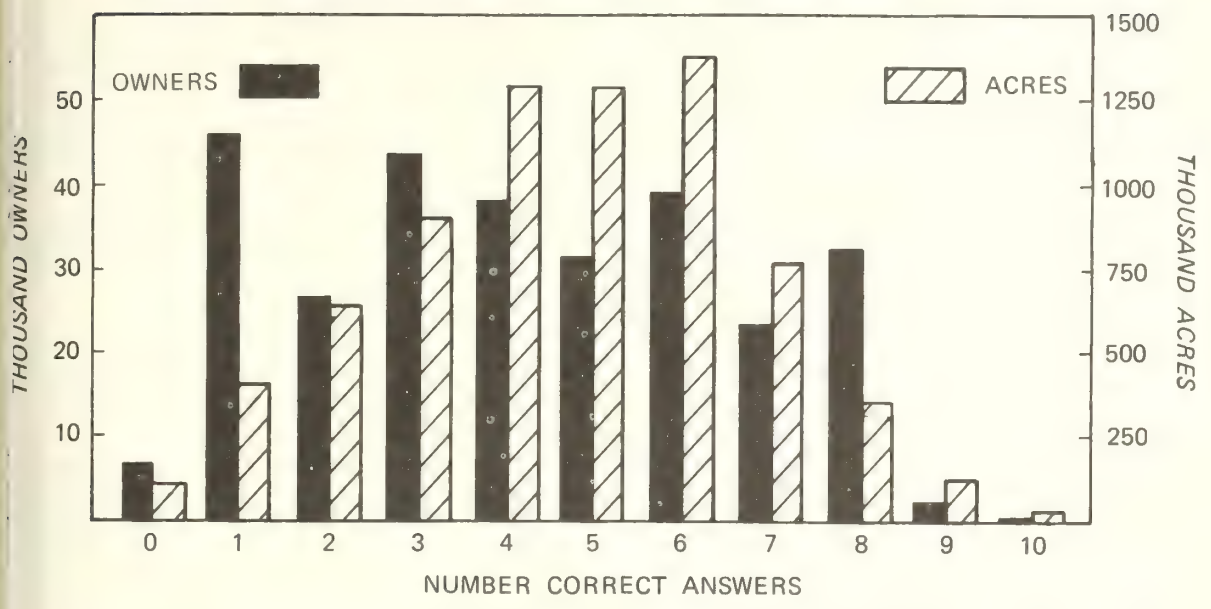
Slightly more people would answer this incor rectly—28 percent—than correctly—25 percent. I appears that 75 percent of the individual owner do not understand that a virgin forest is one tha has not been disturbed by man. Forests that wer logged long ago and are now composed of larg old trees may appear virgin, but technically ar not.

10. Stumpage price is the price paid for stand ing timber.
    Answer. True

Only 2 percent would think that this is a fals statement while 36 percent would consider it to b true, and 35 percent would say they did not know While this does not tell us that a lot of peopl know what stumpage price is, it does indicate tha very few individuals have wrong notions of thi term, which is widely used by timber buyers an sellers.

If we were to grade forest-land owners in Ken tucky based on the results of this quiz, the averag score would be 42 percent. Forty-four percen would receive a score of 50 percent or better. Th distribution of test scores was quite wide. We ha respondents who replied incorrectly to all te statements, and some who replied correctly to al of them (Fig. 15). While this little quiz was not de signed to test woodland owners, it does indicate a great deal of misunderstanding or ignorance o certain forestry concepts. Much of this may be du to the unfamiliarity of forestry terms to the aver age forest-land owner. To be successful, foreste must be sure the landowner understands what he i talking about. It underscores the need to educat owners if even a fraction of the privately owne commercial forest land is to be managed for th production of renewable forest resources.

Figure 15. Estimated number of forest-land owners and acreage owned, by number of correct answers on conservation quiz.



CONCLUSIONS

If we view the privately owned commercial forest land of Kentucky as a source of some of the additional timber that will be in demand in the near future, there is reason to be both pessimistic and optimistic.

On the negative side, the thousands of small ownerships loom as a major stumbling block. With an average-size woodlot of less than 25 acres, the "average" owner is not apt to be serious in managing his land for timber production. Also, since 30 percent of the individual owners have held their woodland for fewer than 10 years, it will be difficult to sustain management for the long time needed to produce a crop of mature timber if the ownership changes hands often during the timber rotation.

Another problem is the owner's lack of interest in and understanding of forestry. Only 5 percent of the owners have received forestry assistance, only 1 percent who have cut timber had that timber selected by a forester, and most landowners have no idea who to contact for forestry assistance. There is little interest among owners in subscribing to conservation publications and even less in belonging to a conservation organization. Those few who show some interest in conservation appear to be concerned more with nontimber forest resources. There is also much misunderstanding and confusion about forestry practices among landowners, and yet these are the very people who will be likely to determine which areas and which trees will be harvested should they decide to cut.

Although things do not appear encouraging for forest management of private woodlands, there are reasons to be optimistic about their potential timber production. By and large, few owners are opposed to harvesting timber from their land. The owners of 54 percent of the private commercial forest land in Kentucky have harvested timber before and may do so in the future. Indeed, 47 percent of the owners holding 71 percent of the private woodland say that they may harvest sometime in the future. Even many owners who expect intangible benefits from their woodland, such as recreational use or esthetic enjoyment, are not opposed to cutting timber.

These facts describe two aspects of private ownerships:

1. The timber resource is underutilized on Kentucky private woodlands.
2. The woodland owners in Kentucky are generally not opposed to cutting their timber.

Through the leadership of professional foresters, if the owners can be educated so that these facts are understood to be complementary, then these privately owned woodlands may be realistically viewed as a potential source of supply to meet ever-increasing demand for wood and fiber.

LITERATURE CITED

Birch, Thomas W., and Neal P. Kingsley.
1978. **The forest-land owners of West Virginia.** U.S. Dep. Agric. For. Serv. Resour. Bull. NE-58, 76 p., illus.

Bones, James T., and Chauncey J. Lohr.
1977. **The timber industries of Kentucky.** U.S. Dep. Agric. For. Serv. Resour. Bull. NE-50. 26 p., illus.

Kingsley, Neal P.
1976. **The forest-land owners of Southern New England.** U.S. Dep. Agric. For. Serv. Resour. Bull. NE-41. 27 p., illus.

Kingsley, Neal P., and Thomas W. Birch.
1977. **The forest-land owners of New Hampshire an Vermont.** U.S. Dep. Agric. For. Serv. Resour. Bull NE-51. 47 p., illus.

Kingsley, Neal P., and Douglas S. Powell.
1978. **The forest resources of Kentucky.** U.S. Dep Agric. For. Serv. Resour. Bull. NE-54, 97 p., illus.

Wilson, Robert W., Jr., and Robert C. Peters.
1967. **The Northeastern Forest Inventory Data Proc essing System. I. Introduction.** U.S. Dep. Agric For. Serv. Res. Pap. NE-61, 20 p., illus.

APPENDIX

Study method

The sampling scheme used in this study was derived from the one used in the Forest Survey by the Northeastern Station. Resources Evaluation field crews attempted to obtain the correct name and mailing address of the owner of each of the 1,518 privately owned forested field plots in the State. These plots are uniformly distributed within each survey unit. The field crews obtained usable addresses of owners for more than 90 percent of the field plots. A total of 1,460 questionnaires were mailed to owners of commercial forest land in Kentucky; 1,052 were returned with usable information.

The questionnaire was developed after several earlier ownership studies were investigated and other investigators consulted. It was field tested before the mass mailing. The mailing consisted of the questionnaire and a covering letter that explained the purpose of the survey. Approximately 2 weeks after the first mailing, a post card was sent to each addressee to remind those who had not responded to return the questionnaire, and to thank those who had sent theirs in. One week later, nonrespondents were mailed a second copy of the questionnaire and the covering letter plus a second letter urging their cooperation. Approximately 1 month later, 531 owners had responded. Then a 100 percent field canvass of nonrespondents was undertaken by personnel of the Division of Forestry, Kentucky Department of Natural Resources. This resulted in an additional 521 usable questionnaires. The 1,052 questionnaires represented 1,104 of the privately owned forested field plots—73 percent.

The probability that a forest-land owner will be sampled depends on the rate of sampling and the acreage of commercial forest land he owns. Each unit in Kentucky had a different rate of sampling. The State forestry organization has divided the State into nine districts. The districts do not match the Forest Survey units. Each district had a different rate of success in persuading nonrespondents to reply. Both the survey rate of sampling and the district success rate affect the probability of an owner being included in the final tabulation. The combinations of units and districts produced 19 sampling areas in Kentucky.

The total acreage of commercial forest land in private ownerships was obtained from the Forest Survey. To calculate the area represented by each plot, the total area of privately owned commercial forest land in each sampling area was divided by the number of field plots represented by the valid questionnaires. In Kentucky, the identification of very large holdings produced a response bias. A response bias is the discrepancy between the "true value" being measured and the expected survey result. For owners of more than 30,000 acres, the estimated acreage exceeded their actual holdings by over 10 percent. To correct this bias, all owners of more than 30,000 acres were handled as an enumeration. Their reported acreages were considered to be without error, and were subtracted from the total commercial forest land in the sampling area. The probabilities of the remaining responses were then calculated on this smaller area.

Since the sampling scheme is essentially the one used for the Forest Survey, there is a low probability of inclusion for owners of small parcels of woodland. To estimate the total number of persons who own commercial forest land in Kentucky, it was necessary to weight the numbers of owners obtained in the samples. This procedure can be stated as:

$$N = \frac{CFL_p}{N_r} \quad \Sigma \quad \frac{1}{A_i}$$

N = estimated number of private owners in the sampling area.

CFL_p = the acres of privately owned commercial forest land in the sampling area.

N_r = number of respondents in the sampling area.

A_i = acres owned by individual respondent.

The ΣN then equals the estimated number of private owners in the State. This is an unbiased estimate of the total number of persons who own commercial forest land in Kentucky.

The data were processed and compiled by computer, using FINSYS generalized computer system (Wilson and Peters 1967).

Except for the holdings of more than 30,000 acres, the acreage of commercial forest land was estimated in a manner similar to that used in the Forest Survey: The area of privately owned land in each sampling area was divided by the number of field plots represented. Thus, if a particular respondent owned land on which one forested plot was located, his response was given a weight of one, if two plots were owned a weight of two or double the acreage, and so on.

It was also necessary to determine if those questionnaires obtained through the mail and those obtained by the field follow-up were samples of the same population. The hypothesis tested was that there was no significant difference in the mean acreage of the subsamples. Student's t-test showed no significant difference at the 99 percent probability level.

Because this study encompasses 19 sampling areas, data have been aggregated to the Forest Survey units. The following tabulation shows th pertinent data for each unit:

Unit	Number of usable question-naires	Number of survey plots	Average acreage per plot
Eastern	87	100	18,006
North Cumberland	158	170	10,259
South Cumberland	195	201	8,645
Bluegrass	129	132	9,915
Pennyroyal	227	233	8,692
Western Coalfield	163	173	10,514
Western	93	95	6,014
Total	1,052	1,104	9,970

Sampling errors

Sampling errors were calculated for the esti mated total number of forest-land owners in eac unit and for the combined total. The samplin error for the number of acres of commercial fores land in private ownership was calculated as part o the Forest Survey. The user of these data is cau tioned that, as the size of any estimate decreases i relation to the total unit estimate, the samplin error, expressed as a percent of the estimate, in creases drastically.

The inclusion of small woodland parcels (fewe than 10 acres) in the study population substan tially increases the sampling error for the esti mated number of owners.

Sampling errors

Unit	Acres of private commercial forest land	Number of owners of private commercial forest land	Number of owners of more than 9 acres
Eastern	± 58,000(±3.22%)	±17,100(±28%)	±3,000(±12%)
North Cumberland	± 55,500(±3.18%)	± 9,600(±18%)	±2,000(± 7%)
South Cumberland	± 59,400(±3.42%)	±10,200(±15%)	±3,100(±11%)
Bluegrass	± 41,600(±3.18%)	±14,200(±19%)	±2,900(±11%)
Pennyroyal	± 54,400(±2.68%)	±15,500(±18%)	±3,000(± 7%)
Western Coalfield	± 30,400(±1.67%)	±19,200(±22%)	±3,000(± 9%)
Western	± 30,100(±5.26%)	± 5,000(±20%)	±1,000(±10%)
Total	±128,900(±1.17%)	±36,300(± 8%)	±7,100(± 4%)

NE FOREST EXPERIMENT STATION
FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE

OMB 40-R-3941

NORTHEASTERN WOODLAND OWNERSHIP STUDY

State _____
County_____
Plot _____

Please complete the following questions to the best of your knowledge. Where actual data are not available please use your best estimate. Please be assured your answers will be held strictly confidential. If you do not now own woodland, please answer questions 1 and 2 and return the questionnaire.

1. How much land do you now own? (Include woodlands, pasture, cropland, etc., but exclude individual house lots.) Acres_____

2. Of all of the land you own how much is woodland? Acres_____ or percent____

3. Is all of the woodland you own in one state?

   Yes _____ What state?_____

   No _____ My woodlands are in more than one state as follows:

   _____ acres in _____ (state)

   _____ acres in _____ (state)

   _____ acres in _____ (state

   _____ acres in _____ (state)

4. How many individual tracts or parcels of woodland do you own? Number_____

5. In what year did you first acquire woodland? Year _____

6. How did you acquire the major portion of the woodland you now own?

Purchase	1.	_____
Inheritance	2.	_____
Other	3.	_____

7. In which one of the follcwing ownership categories does the major portion of your woodland holdings fall? (Please check only one.)

		Check one
Individual (include husband and wife)	1.	_____
Joint ownership	2.	_____
Undivided estate	3.	_____
Partnership	4.	_____
Corporation	5.	_____
Club or association	6.	_____
Other	7.	_____

8. If the ownership is a partnership, corporation, club or association, what is the nature of the business or organization?

_____

Please indicate the title of the person completing this questionnaire.

_____

9. What is the approximate road mileage from your home to your nearest and furthest tract of woodland? (For businesses or organizations consider "home" to mean place of business, or location of organization.)

Miles to the nearest tract (enter zero if you live on the tract). _____

Miles to the furthest tract. _____

10. How many times have you or your representative visited your nearest and furthest tract of woodland in the last 12 months?

Number of visits to the nearest tract _____

Number of visits to the furthest tract _____

11. Which statement most accurately describes your woodland?

Check one

a. Most of the trees are sugar (hard) maple, beech, and yellow birch. _____

b. Most of the trees are red (soft) maple, elm, and ash. _____

c. Most of the trees are oaks, hickories, gums, and yellow-poplar. _____

d. Most of the trees are pines. _____

e. Most of the trees are softwoods other than pines. _____

f. None of the above apply. Please describe your woodland briefly: _____

_____

g. I do not know what kinds of trees are on my land. _____

12. Which statement most accurately describes average size of the trees in your woodland?

Check one

a. The average tree is 5 inches in diameter or smaller. _____

b. The average tree is between 5 and 12 inches in diameter. _____

c. The average tree is 12 inches in diameter or larger. _____

d. I don't know how big the trees are. _____

13. Have you ever harvested timber or trees from your land?

Yes 1._____ No. 2._____

NOTE: IF YOU HAVE NEVER HARVESTED TIMBER OR TREES FROM YOUR WOODLAND SKIP TO QUESTION 22.

14. In what year did the most recent timber harvest take place? _____

15. What percent of your woodland was involved in the most recent timber sale? _____

16. What percent, if any, of your woodland do you feel you would never harvest timber from? _____

17. What products were harvested? (Check as many as apply.)

	Check		Check
Sawlogs	1. ____	Mine timbers	6. ____
Veneer logs or bolts	2. ____	Christmas trees	7. ____
Pulpwood	3. ____	Other (please specify)____	8. ____
Turnery bolts	4. ____	Don't know what products were harvested	9. ____
Posts, poles, or piling	5. ____		

18. Please indicate amounts of products harvested.

Product	Amount	Unit of measure
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

19. How were your trees selected for harvesting? (Please check only the method that accounted for the greatest volume, if more than one method was used.)

	Check one
Selection (only preselected market trees were removed).	1. _____
Diameter limit (only trees over a minimum diameter were removed). Please indicate minimum diameter _____	2. _____
Clearcutting (most or all of the trees on a given area were removed).	3. _____
Land clearing (trees were harvested incidental to clearing the land for a use other than woodland).	4. _____
Other (please specify) _____	5. _____
Don't know method used.	6. _____

20. Who selected the area or trees to be harvested?

	Check one
1. Landowner	_____
2. Forester	_____
3. Friend or neighbor	_____
4. Timber buyer or logger	_____
5. Combination of _____ and _____	_____

21. If you did not have the assistance of a forester in the harvesting of your timber, do you now wish you had?

	Check
Yes	_____
No	_____
No feeling either way	_____
If yes, why _____	_____

22. Why did you harvest timber at the time that you did? (Check only the one reason you consider most important.)

	Check one
Felt timber was mature	1. _____
Offered a good price	2. _____
Land clearing	3. _____
Needed money	4. _____
Needed timber for own use	5. _____
Timber harvest for company use (industry only)	6. _____
Other (please specify) _____	7. _____

23. If you have never harvested timber or trees from your land, why not? (Please check only the reason you consider most important).

		Check one
Woodland immature - timber too small	1.	_____
No market for timber	2.	_____
Price offered or prevailing market price too low	3.	_____
Value of land for hunting would be destroyed	4.	_____
Selling or plan to sell the land	5.	_____
Scenery would be destroyed	6.	_____
Land tied up in estate	7.	_____
Distrust of loggers	8.	_____
Opposed to timber harvesting	9.	_____
Poor quality timber	10.	_____
Not enough volume	11.	_____
Logging would create a fire hazard	12.	_____
Insufficient area to harvest	13.	_____
Other (please specify) _____	14.	_____

24. Do you plan to harvest timber from your woodlands in:

		Check one
Next 5 years	1.	_____
5 to 10 years	2.	_____
Possibly at some future date	3.	_____
Never plan to harvest	4.	_____

25. Have you ever sought the assistance of a forester for advice or help in managing your woodland?

Yes _____ Please indicate the nature of assistance. _____

_____

No _____

26. What office, agency, or individual would you contact for forestry assistance? (If you don't know, please write in "don't know.")

_____

27. Why do you own woodland? (Please rank in order of importance those items that are applicable, with number 1 the most important.)

	Rank
Land investment (hope to sell all or part of my woodland at a profit).	____
Recreation (hunting, camping, fishing, etc.).	____
Timber production (growing timber or other forest products for sale).	____
Farm or domestic use (source of forest products for own use, i.e., firewood, fence posts, etc.).	____
Aesthetic enjoyment (the desire to have woodland and "green space" around my home).	____
Part of the farm (the woodland is part of the farm but serves no useful function in the farm operation).	____
Part of my residence.	____
Other (please specify) _____	____

28. Which of the following do you feel were the most important benefits you derived from your woodland in the last 5 years? (Please rank in order of importance those items that are applicable, with number 1 the most important.)

	Rank
Increase in land value (investment).	____
Recreation (hunting, fishing, camping, etc.).	____
Income from the sale of timber.	____
Aesthetics (just enjoy woodland, wildlife, and the general satisfaction of owning "green space").	____
Farm and domestic use.	____
Other (please specify) _____	____

29. Which of the following do you feel will be the most important benefits you expect to derive from your woodland in the next 5 years? (Please rank in order of importance those items that are applicable, with number 1 the most important.)

	Rank
Increase in land value (investment).	____
Recreation (hunting, camping, etc.).	____
Income from sale of timber.	____
Aesthetics (just enjoy woodland, wildlife, and the general satisfaction of owning "green space").	____
Farm or domestic use.	____
Other (please specify) _____	____

30. Is the general public, other than your family and immediate circle of friends, permitted to use your woodland for any of the following?

		Check
Hiking	1.	_____
Picnicking	2.	_____
Camping	3.	_____
Fishing (check only if fishing is available)	4.	_____
Hunting	5.	_____
Snowmobiling	6.	_____
Other (Please specify)	7.	_____
Public use not permitted	8.	_____

31. Is your land posted?

No _____, go to next question.

Yes_____, why is it posted? _____

32. Have you been approached to sell all or part of your woodland in the last five years?

Yes_____ No_____

33. Are you an active member of any of the following organizations? (Please check those you are a member of.)

		Check
American Forestry Association	1.	_____
Ohio Forestry Association	2.	_____
Pennsylvania Forestry Association	3.	_____
Isaac Walton League	4.	_____
Audubon Society	5.	_____
Natural History Society	6.	_____
National Wildlife Federation	7.	_____
A Sportsman's Club	8.	_____
A Garden Club	9.	_____
National Farmer's Organization	10.	_____
The Grange	11.	_____
The American Tree Farm Program	12.	_____
The Sierra Club	13.	_____
Any other organizations similar to those listed above (Please specify)_____	14.	_____
No, I don't hold membership in any of the above.	15.	_____

34. Do you or any member of your household subscribe to any of the following magazines? (Please check those that apply.)

		Check
Tree Farm News	1.	_____
American Forests	2.	_____
National Wildlife	3.	_____
Forest Farmer	4.	_____
Ohio Woodlands	5.	_____
Pennsylvania Forests	6.	_____
Pennsylvania Game News	7.	_____
Audubon Magazine	8.	_____
National Parks and Recreation	9.	_____
Field and Stream	10.	_____
Sports Afield	11.	_____
Kentucky Farmer	12.	_____
Agway Cooperator	13.	_____
Ranger Rick Nature Magazine	14.	_____
Our Heritage	15.	_____
Forests and People	16.	_____
Ohio Farmer	17.	_____
Maryland Conservation	18.	_____
West Virginia Conservation	19.	_____
Pennsylvania Farmer	20.	_____
Any other magazine similar to those listed above (Please specify) _____	21.	_____
No, I don't subscribe to any of the above magazines.	22.	_____

35. Please indicate whether each of the following statements is true or false. If you feel you don't know, don't guess, please check "Don't Know" column.

	True	False	Don't Know
a. Conservation means that natural resources should be used wisely.	____	____	____
b. Once a forest is cut it will not grow back unless planted.	____	____	____
c. Sustained yield is an important forestry objective.	____	____	____
d. Clearcutting is always bad forestry.	____	____	____
e. All forest land in the United States is managed.	____	____	____
f. Selective logging is always good forestry.	____	____	____
g. Commercial forest land is forest land that is owned by wood-using industries.	____	____	____
h. An ecosystem is any complex of living organisms together with their environment that is isolated for study.	____	____	____
i. A virgin forest is any forest of old or large trees.	____	____	____
j. Stumpage price is the price paid for standing timber.	____	____	____

The following questions are asked to classify responses on the basis of information about the owner personally. Again, we would remind you that the answers to these questions, and to any other questions on this questionnaire are strictly confidential. All answers will be compiled in such a manner that it will be impossible to identify any individual reply.

These questions do not pertain to and should not be answered by corporations and organizations.

If the woodland is owned by more than one person, the following questions should be answered for the person to whom the questionnaire is addressed.

36. During the first 12 years of the owner's life where did he live most of the time?

		Check one
In a city with a population of 100,000 or more	1.	_____
In a city with a population of 10,000 to 99,999	2.	_____
In a town or city with a population of less than 10,000	3.	_____
In a rural area	4.	_____
On a farm	5.	_____

37. What is the sex of the owner?

Male _____ Female _____

38. What is the age of the owner?

		Check one
Under 25	1.	_____
25-44	2.	_____
45-64	3.	_____
65 and over	4.	_____

39. How many years of formal education has the owner completed?

	Check one
Grades 1- 8	1. _____
Grades 9-12	2. _____
Has some schooling beyond high school (business technical school, or some college)	3. _____
Has a bachelor's degree or equivalent	4. _____
Has some graduate work	5. _____
Holds a master's degree	6. _____
Holds a doctoral degree	7. _____

40. What is the primary occupation of the owner? _____

41. In which category would the owner's personal gross income from all sources fall?

	Check one
Less than $10,000	1. _____
$10,000 to $14,999	2. _____
$15,000 to $19,999	3. _____
$20,000 to $24,999	4. _____
$25,000 to $29,999	5. _____
$30,000 or more	6. _____

42. Comments?

Definition of terms

Average annual net growth of growing stock. The change (resulting from natural causes) in volume of sound wood in sawtimber and poletimber trees during the period between surveys, divided by the length of the period. Components of annual net growth of growing stock include the increment in net volume of trees present at the beginning of the period and surviving to its end, plus net volume of trees reaching poletimber size during that period, minus the net volume of trees that died during the period, minus cull increment (the net volume of trees that became rough or rotten during the period).

Board foot. A unit of lumber measurement 1 foot long, 1 foot wide, and 1 inch thick, or its equivalent. By Resources Evaluation convention, softwoods less than 9.0 inches in dbh and hardwoods less than 11.0 inches in dbh do not contain board-foot volume.

Clearcutting. The method of regenerating timber in which the area is cut clear in the literal sense of the word; virtually all the trees, large and small, are removed. The term is often erroneously applied to any type of cutting in which all the merchantable timber is removed and all that is not merchantable is left standing.

Commercial forest land. Forest land that is producing or capable of producing crops of industrial wood (more than 20 ft^3/acre/year) and that is not withdrawn from timber utilization. (Industrial wood is all roundwood products except fuelwood.)

Diameter limit. The method of regenerating timber in which all trees above a specified diameter are removed.

Forest industries. Companies or individuals operating wood-using plants.

Forest land. Land that is at least 16.7 percent stocked (contains at least 7.5 ft^2 of basal area) by forest trees of any size, or that formerly had such tree cover and is not currently developed for nonforest use. (Forest trees are woody plants that have a well developed stem and usually are more than 12 feet in height at maturity.) The minimum area for classification of forest land is 1 acre.

Growing-stock trees. Live trees of commercial species that are classified as sawtimber, poletimber, saplings, and seedlings; that is, all live trees of commercial species except rough and rotten trees.

Growing-stock volume. Net volume, in ft^3, of growing-stock trees that are 5.0 inches in dbh or larger, from a 1-foot stump to a minimum 4.0-inch top diameter outside bark of the central stem.

Hardwoods. Dicotyledonous trees, usually broad-leaved and deciduous.

Private commercial forest land. All commercial forest land other than that owned by Federal, state, or local governments or their agencies.

Pulpwood. Any log from which woodpulp is to be made; usually measured in bolts of 4, 5, or 8 feet, and somewhat smaller in diameter than sawlogs or veneer logs.

Sawlog. Any log from which lumber is to be sawn.

Sawtimber trees. Live trees of commercial species: (a) that are of the following minimum diameter at breast height: softwoods, 9.0 inches and hardwoods 11.0 inches, and (b) that contain at least one 12-foot or two noncontiguous 8-foot merchantable sawlogs, and that meet regional specifications for freedom from defect.

Sawtimber volume. Net volume in board feet, International 1/4-inch rule, of merchantable sawlogs in live sawtimber trees. Net volume equals gross volume less deductions for rot, sweep, and other defects that affect use for lumber.

Selection system. The method of regenerating timber in which trees of all sizes are harvested. However, in practice, frequently only the oldest or largest trees in a stand are harvested. Trees are taken singly or in small groups, but the entire stand is never cleared completely in a single operation.

Softwoods. Coniferous trees, usually evergreen, with needles or scalelike leaves.

Stand. A growth of trees on forest land.

Timber removals. The volume of growing-stock or sawtimber trees harvested or killed in logging or in cultural operations such as timber stand improvement, land clearing, or changes in land use.

Timber salvage. Removals of down, damaged, or diseased trees.

Veneer log. Any log from which veneer is to be made, by peeling (rotary cutting) or slicing.

Metric equivalents of units used in this report

One inch = 25.4 millimeters (mm) or 2.54 centimeters (cm)
One foot = 30.48 centimeters (cm) or 0.3048 meters (m)
One mile = 1.609 kilometers (km)
One square foot (ft^2) = 929.03 square centimeters (cm^2) or 0.0929 square meters (m^2)
One acre = 4,046.873 square meters (m^2) or 0.4046873 hectares (ha)
Million acres = 404,687.3 hectares (ha)
One cubic foot (ft^3) = 28,317 cubic centimeters (cm^3) or 0.028317 cubic meters (m^3)
Thousand cubic feet (ft^3) = 28.317 cubic meters (m^3)
Million cubic feet (ft^3) = 28,317 cubic meters (m^3)

INDEX TO TABLES

Table 1. Estimated number of private owners of commercial forest land and acres owned, by size class of ownership and geographic unit, Kentucky, 1975.
Table 2. Estimated number of private owners of commercial forest land and acres owned, by form of ownership and geographic unit, Kentucky, 1975.
Table 3. Estimated number of corporate owners of commercial forest land and acres owned, by nature of business, Kentucky, 1975.
Table 4. Estimated number of individual owners of commercial forest land and acres owned, by occupation and geographic unit, Kentucky, 1975.
Table 5. Age class of individual owners, by number of owners, acres of commercial forest land owned, and geographic units, Kentucky, 1975.
Table 6. Years of formal education of individual owners, by number of owners, acres of commercial forest land owned, and geographic unit, Kentucky, 1975.
Table 7. Individual owner by income groups, number of owners, acres of commercial forest land owned, and geographic unit, Kentucky, 1975.
Table 8. Early environment of individual owners, by number of owners, acres of commercial forest land owned, and geographic unit, Kentucky, 1975.
Table 9. Estimated number of individual owners of commercial forest land and acres owned, by period of ownership, and geographic unit, Kentucky 1975.
Table 10. Distance from owner's residence or place of business to his nearest tract, by number of owners, acres of commercial forest land owned and geographic unit, Kentucky, 1975.
Table 11. Number of tracts of commercial forest land owned, by number of owners, acres owned and geographic unit, Kentucky, 1975.
Table 12. Estimated number of owners of commercial forest land and acres owned, by distance from tracts and number of tracts owned, Kentucky, 1975.
Table 13. Estimated number of owners of commercial forest land and acres owned, by primary reason for owning and geographic unit, Kentucky 1975.
Table 14. Estimated number of owners who have not harvested timber and acres owned, by primary reason for owning forest land and geographic unit, Kentucky, 1975.
Table 15. Estimated number of owners who have harvested timber and acres owned, by primary reason for owning forest land and geographic unit, Kentucky, 1975.
Table 16. Primary reason for owning commercial forest land by intention to harvest for all owners and number of acres owned, Kentucky, 1975.
Table 17. Benefits derived in the last 5 years and expected in the next 5 years, by number of owners who have harvested timber and number who have not and by acres of commercial forest land owned Kentucky, 1975.
Table 18. Benefits derived in the last 5 years and expected in the next 5 years, by number of owners who have harvested timber and number who have not and by acres of commercial forest land owned in the EASTERN geographic unit of Kentucky 1975.
Table 19. Benefits derived in the last 5 years and expected in the next 5 years, by number of owners who have harvested timber and number who have not and by acres of commercial forest land owned in the NORTHERN CUMBERLAND geographic unit of Kentucky, 1975.
Table 20. Benefits derived in the last 5 years and expected in the next 5 years, by number of owners who have harvested timber and number who have not and by acres of commercial forest land owned in the SOUTHERN CUMBERLAND geographic unit of Kentucky, 1975.
Table 21. Benefits derived in the last 5 years and expected in the next 5 years, by number of owners who have harvested timber and number who have

ıot and by acres of commercial forest land owned n the PENNYROYAL geographic unit of Ken-ucky, 1975.
Table 22. Benefits derived in the last 5 years and xpected in the next 5 years by number of owners vho have harvested timber and number who have ıot and by acres of commercial forest land owned n the BLUEGRASS geographic unit of Kentucky, 975.
Table 23. Benefits derived in the last 5 years and xpected in the next 5 years by number of owners vho have harvested timber and number who have ıot and by acres of commercial forest land owned n the WESTERN COALFIELD geographic unit f Kentucky, 1975.
Table 24. Benefits derived in the last 5 years and xpected in the next 5 years by number of owners vho have harvested timber and number who have ot and by acres of commercial forest land owned n the WESTERN geographic unit of Kentucky, 975.
Table 25. Primary benefit expected in the next 5 ears, by intention to harvest, number of owners, nd acres of commercial forest land owned, Ken-ucky, 1975.
Table 26. Reason for harvesting, by ownership roup, number of owners, and acres of commer-ial forest land owned, Kentucky, 1975.
Table 27. Reason for harvesting, by number of wners, acres of commercial forest land owned, nd geographic units, Kentucky, 1975.
Table 28. Reason for not harvesting, by owner-hip groups, number of owners, and acres of com-nercial forest land owned, Kentucky, 1975.
Table 29. Reason for not harvesting, by number f owners, acres of commercial forest land owned, nd geographic units, Kentucky, 1975.
Table 30. Expected time of future timber harvest, y number of owners and acres owned, for owners vho have previously harvested and owners who ave not, Kentucky, 1975.
Table 31. Expected time of future timber harvest, y number of owners and acres owned, for owners vho have previously harvested and owners who ave not, in the EASTERN geographic unit of entucky, 1975.
Table 32. Expected time of future timber harvest, y number of owners and acres owned, for owners vho have previously harvested and owners who ave not, in the NORTHERN CUMBERLAND eographic unit of Kentucky, 1975.
Table 33. Expected time of future timber harvest, by number of owners and acres owned, for owners who have previously harvested and owners who have not, in the SOUTHERN CUMBERLAND geographic unit of Kentucky, 1975.
Table 34. Expected time of future timber harvest, by number of owners and acres owned, for owners who have previously harvested and owners who have not, in the BLUEGRASS geographic unit of Kentucky, 1975.
Table 35. Expected time of future timber harvest, by number of owners and acres owned, for owners who have previously harvested and owners who have not, in the PENNYROYAL geographic unit of Kentucky, 1975.
Table 36. Expected time of future timber harvest, by number of owners and acres owned, for owners who have previously harvested and owners who have not, in the WESTERN COALFIELD geographic unit of Kentucky, 1975.
Table 37. Expected time of future timber harvest, by number of owners and acres owned, for owners who have previously harvested and owners who have not, in the WESTERN geographic unit of Kentucky, 1975.
Table 38. Expected time of future timber harvest, by size class of ownership, number of owners, and acres of commercial forest land owned, Kentucky, 1975.
Table 39. Person choosing timber to be harvested, by number of owners, acres of commercial forest land owned, and geographic units, of Kentucky, 1975.
Table 40. Method of selecting timber to be harvested, by number of owners, acres of commercial forest land owned, and geographic units, Kentucky, 1975.
Table 41. Person choosing timber to be harvested, by method of selecting timber, number of owners, and acres of commercial forest land owned, Kentucky, 1975.
Table 42. Timber harvested, by product, number of owners, by acres of commercial forest land owned, and geographic unit, Kentucky, 1975.
Table 43. Agency that owners would contact for forestry assistance, by number of owners, acres of commercial forest land owned, and geographic units, Kentucky, 1975.
Table 44. Forestry services received, by nature of service, number of owners, acres of commercial forest land owned, and geographic units, Kentucky, 1975.

Table 45. Estimated number of owners who permit and do not permit public use of their land, by acres of commercial forest land owned and by geographic unit, Kentucky, 1975.
Table 46. Estimated number of owners who permit public use, by uses permitted, acres of commercial forest land owned, and geographic units, Kentucky, 1975.
Table 47. Estimated number of private owners of commercial forest land and acres owned, by reason for posting the land and geographic unit, Kentucky, 1975.
Table 48. Estimated number of individual owners of commercial forest land and acres owned, by conservation-related organization membership Kentucky 1975.
Table 49. Estimated number of individual owners of commercial forest land and acres owned, by conservation-oriented publications they receive Kentucky, 1975.
Table 50. Responses to true-false statements, by individual owners of commercial forest land and acres owned, Kentucky, 1975.
Table 51. Estimated number of individual owners of commercial forest land and acres owned, by percent score on 10 true-false statements, Kentucky, 1975.

Table 1.—Estimated number of private owners of commercial forest land and acres owned, by size class and ownership and geographic unit, Kentucky, 1975

Size class (acres)	Eastern		Northern Cumberland		Southern Cumberland		Bluegrass	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
1-9	34,300	58	26,400	48	38,700	58	48,800	66
10-19	2,600	4	3,400	6	8,100	12	10,300	14
20-49	17,000	28	13,900	26	11,800	18	7,900	11
50-99	4,300	7	7,000	13	5,300	8	4,200	6
100-199	1,300	2	2,500	5	2,200	3	2,500	3
200-499	600	1	900	2	700	1	500	**
500-999	*	**	100	**	100	**	100	**
1000+	100	**	*	**	100	**	*	**
Total	60,200	100	54,200	100	67,000	100	74,300	100
				ACRES OWNED				
1-9	108,500	6	89,100	5	138,300	8	163,400	13
10-19	39,600	2	52,400	3	95,000	5	120,000	9
20-49	511,100	28	419,200	24	345,400	20	215,100	17
50-99	293,700	16	439,500	25	362,600	21	279,900	21
100-199	152,500	9	329,600	19	285,000	17	292,400	22
200-499	153,200	9	232,700	13	224,500	13	136,900	10
500-999	39,600	2	61,000	4	77,700	4	37,700	3
1000+	502,400	28	120,600	7	209,100	12	63,400	5
Total	1,800,600	100	1,744,100	100	1,737,600	100	1,308,800	100

Size class (acres)	Pennyroyal		Western Coalfield		Western		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
1-9	46,700	54	52,200	60	13,900	57	261,000	57
10-19	17,100	19	13,200	15	3,400	14	58,100	13
20-49	14,700	17	13,000	15	3,900	16	82,200	18
50-99	5,500	6	6,100	7	2,100	9	34,500	8
100-199	2,600	3	1,900	2	700	3	13,700	3
200-499	1,300	1	900	1	200	1	5,100	1
500-999	100	**	200	**	100	**	700	**
1000+	100	**	*	**	*	**	300	**
Total	88,100	100	87,500	100	24,300	100	455,600	100
				ACRES OWNED				
1-9	121,700	6	133,100	7	51,800	9	805,900	7
10-19	219,200	11	155,600	8	46,000	8	727,800	7
20-49	443,900	21	366,500	20	121,000	21	2,422,200	21
50-99	337,200	17	374,800	21	126,700	23	2,214,400	20
100-199	317,300	16	245,600	14	97,900	17	1,720,300	16
200-499	378,100	19	237,500	13	46,100	8	1,409,000	13
500-999	64,000	3	113,200	6	28,800	5	422,000	4
1000+	143,800	7	192,700	11	53,000	9	1,285,000	12
Total	2,025,200	100	1,819,000	100	571,300	100	11,006,600	100

*Fewer than 50 owners.
**Less than 0.5 percent.

Table 2.—Estimated number of private owners of commercial forest land and acres owned, by form of ownership and geographic unit, Kentucky, 1975

Form of ownership	Owners		Commercial forest land owned		Owners who have harvested	Acres owned by harvesters
	Number	*Percent*	*Acres*	*Percent*	*Percent*	*Percent*
			EASTERN			
Individuals	53,000	88	1,192,800	66	28	30
Corporations	500	1	453,300	25	**	22
Partnerships	—	—	—	—	—	—
Undivided estate	6,700	11	154,500	9	**	2
Other	—	—	—	—	—	—
Total	60,200	100	1,800,600	100	28	54
			NORTHERN CUMBERLAND			
Individuals	52,300	96	1,528,000	88	17	36
Corporations	**	**	118,400	7	**	6
Partnerships	100	**	19,500	1	**	1
Undivided estate	1,700	4	69,600	4	2	2
Other	100	**	8,600	**	**	**
Total	54,200	100	1,744,100	100	19	45
			SOUTHERN CUMBERLAND			
Individuals	62,200	93	1,519,800	87	24	47
Corporations	100	**	96,800	6	**	5
Partnerships	300	**	25,900	1	**	**
Undivided estate	4,400	7	86,400	5	2	3
Other	*	**	8,700	1	**	1
Total	67,000	100	1,737,600	100	26	56
			BLUEGRASS			
Individuals	72,600	98	1,158,500	89	28	40
Corporations	100	**	31,200	2	**	2
Partnerships	1,300	2	57,600	4	**	1
Undivided estate	300	**	61,500	5	**	2
Other	—	—	—	—	—	—
Total	74,300	100	1,308,800	100	28	45
			PENNYROYAL			
Individuals	81,600	93	1,850,400	91	28	56
Corporations	500	1	51,800	3	**	2
Partnerships	3,900	4	80,200	4	2	2
Undivided estate	1,100	1	17,400	1	**	**
Other	1,000	1	25,400	1	**	**
Total	88,100	100	2,025,200	100	30	60

CONTINUED

Table 2.—Continued

Form of ownership	Owners		Commercial forest land owned		Owners who have harvested	Acres owned by harvesters
	Number	*Percent*	*Acres*	*Percent*	*Percent*	*Percent*
			WESTERN COALFIELD			
Individuals	81,900	93	1,478,300	81	32	42
Corporations	1,400	2	230,900	12	1	11
Partnerships	2,400	3	31,900	2	3	2
Undivided estate	1,800	2	66,200	4	2	3
Other	*	**	11,700	1	**	1
Total	87,500	100	1,819,000	100	38	59
			WESTERN			
Individuals	23,600	97	472,200	83	43	50
Corporations	*	**	41,500	7	**	7
Partnerships	400	2	28,800	5	2	5
Undivided estate	300	1	23,000	4	**	1
Other	*	**	5,800	1	**	1
Total	24,300	100	571,300	100	45	64
			TOTAL			
Individuals	427,200	94	9,200,000	84	28	43
Corporations	2,600	1	1,023,900	9	**	8
Partnerships	8,400	2	243,900	2	1	1
Undivided estate	16,300	3	478,600	4	1	2
Other	1,100	**	60,200	1	**	**
Total	455,600	100	11,006,600	100	30	54

* Fewer than 50 owners or acres.
** Less than 0.5 percent.

Table 3.—Estimated number of corporate owners of commercial forest land and acres owned, by nature of business, Kentucky, 1975

Nature of business	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
Real estate	400	15	117,000	11
Forest industry	100	4	170,900	17
Nonforest industry	1,000	38	602,900	59
Corporate farms	200	8	30,400	3
Other corporations	900	35	102,700	10
Total	2,600	100	1,023,900	100

Table 4.—Estimated number of individual owners of commercial forest land and acres owned, l occupation and geographic unit, Kentucky, 1975

Owner occupation	Eastern		Northern Cumberland		Southern Cumberland		Bluegrass	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
Professional	600	1	800	2	5,200	9	1,500	2
Executive	500	1	700	1	1,200	2	*	**
Retired	10,900	21	12,700	24	16,000	26	6,800	9
White collar	1,000	2	500	1	1,400	2	20,800	29
Skilled labor	18,400	35	2,300	4	2,000	3	4,000	5
Housewife	3,600	7	900	2	5,100	9	—	—
Laborer	1,700	3	700	1	2,000	3	1,400	2
Farmer	2,900	5	11,000	21	11,400	18	27,500	38
Other	1,100	2	300	1	2,100	3	—	—
No answer	12,300	23	22,400	43	15,800	25	10,600	15
Total	53,000	100	52,300	100	62,200	100	72,600	100
				ACRES OWNED				
Professional	68,900	6	82,000	5	129,500	9	60,700	5
Executive	83,600	7	75,900	5	69,100	4	9,500	1
Retired	332,000	28	379,800	24	431,800	28	143,500	13
White collar	45,400	4	30,400	2	69,100	4	98,900	9
Skilled labor	93,200	8	102,200	7	103,600	7	97,500	8
Housewife	54,900	5	30,500	2	120,900	9	—	—
Laborer	102,000	8	43,700	3	95,000	6	51,200	4
Farmer	123,800	10	487,900	32	345,400	23	577,200	50
Other	39,600	3	8,600	1	43,100	3	—	—
No answer	249,400	21	287,000	19	112,300	7	120,000	10
Total	1,192,800	100	1,528,000	100	1,519,800	100	1,158,500	100

CONTINUED

Table 4.—Continued

Owner occupation	Pennyroyal		Western Coalfield		Western		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
Professional	5,100	6	1,500	2	900	4	15,600	4
Executive	2,500	3	2,600	3	*	**	7,500	2
Retired	25,800	32	15,400	19	12,600	53	100,200	23
White collar	11,500	14	800	1	700	3	36,700	9
Skilled labor	5,900	7	13,700	17	1,300	6	47,600	11
Housewife	1,000	1	5,100	6	900	4	16,600	4
Laborer	2,400	3	6,000	7	300	1	14,500	3
Farmer	17,500	22	32,400	40	4,900	21	107,600	25
Other	*	**	200	**	500	2	4,200	1
No answer	9,900	12	4,200	5	1,500	6	76,700	18
Total	81,600	100	81,900	100	23,600	100	427,200	100
				ACRES OWNED				
Professional	105,600	6	78,800	5	34,400	7	559,900	6
Executive	112,400	6	99,000	7	11,500	2	461,000	5
Retired	298,000	16	212,300	14	155,500	33	1,952,900	21
White collar	150,900	8	63,900	4	17,300	4	475,900	5
Skilled labor	119,200	6	102,900	7	46,100	10	664,700	7
Housewife	54,600	3	62,500	4	17,300	4	340,700	4
Laborer	88,200	5	86,300	6	11,500	2	477,900	5
Farmer	759,400	42	703,400	48	144,000	31	3,141,100	35
Other	8,100	**	8,500	1	23,100	5	131,000	1
No answer	154,000	8	60,700	4	11,500	2	994,900	11
Total	1,850,400	100	1,478,300	100	472,200	100	9,200,000	100

Fewer than 50 owners.
*Less than 0.5 percent.

Table 5.—Age class of individual owners, by number of owners, acres of commercial forest land owned, and geographic units, Kentucky, 1975

Age class (years)	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
		EASTERN		
Under 25	—	—	—	—
25-44	19,600	37	118,000	10
45-64	9,400	18	442,900	37
65 and over	14,200	27	376,000	32
No answer	9,800	18	255,900	21
Total	53,000	100	1,192,800	100
		NORTHERN CUMBERLAND		
Under 25	—	—	—	—
25-44	10,100	19	239,100	16
45-64	8,100	16	478,900	31
65 and over	15,400	29	546,600	36
No answer	18,700	36	263,400	17
Total	52,300	100	1,528,000	100
		SOUTHERN CUMBERLAND		
Under 25	100	**	8,600	1
25-44	16,300	26	267,700	18
45-64	24,400	39	699,500	46
65 and over	17,600	29	414,500	27
No answer	3,800	6	129,500	8
Total	62,200	100	1,519,800	100
		BLUEGRASS		
Under 25	—	—	—	—
25-44	7,700	11	254,700	22
45-64	38,900	53	518,700	45
65 and over	14,000	19	234,800	20
No answer	12,000	17	150,300	13
Total	72,600	100	1,158,500	100

CONTINUED

Table 5.—Continued

Age class (years)	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
		PENNYROYAL		
Under 25	8,700	11	34,800	2
25-44	22,700	28	330,300	18
45-64	18,200	22	781,100	42
65 and over	26,500	32	550,200	30
No answer	5,500	7	154,000	8
Total	81,600	100	1,850,400	100
		WESTERN COALFIELD		
Under 25	—	—	—	—
25-44	18,900	23	256,800	17
45-64	35,100	43	723,700	49
65 and over	19,300	24	405,100	28
No answer	8,600	10	92,700	6
Total	81,900	100	1,478,300	100
		WESTERN		
Under 25	100	**	5,800	1
25-44	3,800	16	63,300	14
45-64	5,200	22	218,800	46
65 and over	12,500	53	161,300	34
No answer	2,000	9	23,000	5
Total	23,600	100	472,200	100
		TOTAL		
Under 25	8,900	2	49,200	**
25-44	99,100	23	1,529,900	17
45-64	139,300	33	3,863,600	42
65 and over	119,500	28	2,688,500	29
No answer	60,400	14	1,068,800	12
Total	427,200	100	9,200,000	100

**Less than 0.5 percent.

Table 6.—Years of formal education of individual owners, by number of owners, acres of commercial forest land owned, and geographic unit, Kentucky, 1975

Education level	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
			EASTERN	
0-8 years	21,600	41	549,600	46
9-12 years	15,700	30	131,400	11
1-4 years of college	3,800	7	217,000	18
More than 4 years of college	100	**	30,000	3
No answer	11,800	22	264,800	22
Total	53,000	100	1,192,800	100
			NORTHERN CUMBERLAND	
0-8 years	17,700	34	705,700	46
9-12 years	3,100	6	256,700	17
1-4 years of college	4,800	9	161,000	10
More than 4 years of college	900	2	85,500	6
No answer	25,800	49	319,100	21
Total	52,300	100	1,528,000	100
			SOUTHERN CUMBERLAND	
0-8 years	43,200	69	794,400	52
9-12 years	7,300	12	233,100	16
1-4 years of college	4,500	7	215,900	14
More than 4 years of college	2,800	5	138,200	9
No answer	4,400	7	138,200	9
Total	62,200	100	1,519,800	100
			BLUEGRASS	
0-8 years	16,200	22	293,300	25
9-12 years	12,200	17	277,500	24
1-4 years of college	14,700	20	216,700	19
More than 4 years of college	13,200	18	105,000	9
No answer	16,300	23	266,000	23
Total	72,600	100	1,158,500	100

CONTINUED

Table 6.—Continued

Education level	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
		PENNYROYAL		
0-8 years	48,300	59	768,700	41
9-12 years	9,600	12	395,600	21
1-4 years of college	7,800	10	352,100	19
More than 4 years of college	5,800	7	176,300	10
No answer	10,100	12	157,700	9
Total	81,600	100	1,850,400	100
		WESTERN COALFIELD		
0-8 years	35,200	43	687,300	46
9-12 years	38,700	47	419,600	28
1-4 years of college	3,700	5	174,000	12
More than 4 years of college	1,700	2	128,200	9
No answer	2,600	3	69,200	5
Total	81,900	100	1,478,300	100
		WESTERN		
0-8 years	9,900	42	184,300	39
9-12 years	5,600	24	115,200	24
1-4 years of college	5,500	23	103,700	22
More than 4 years of college	1,000	4	46,000	10
No answer	1,600	7	23,000	5
Total	23,600	100	472,200	100
		TOTAL		
0-8 years	192,100	45	3,983,300	43
9-12 years	92,200	22	1,829,100	20
1-4 years of college	44,800	10	1,440,400	16
More than 4 years of college	25,500	6	709,200	8
No answer	72,600	17	1,238,000	13
Total	427,200	100	9,200,000	100

**Less than 0.5 percent.

Table 7. Individual owners by income groups, number of owners, acres of commercial forest land owned, and geographic unit, Kentucky, 1975

Income category	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
			EASTERN	
Less than $10,000	30,300	57	509,400	43
$10,000-$14,999	2,700	5	102,700	8
$15,000-$19,999	400	1	48,500	4
$20,000-$24,999	—	—	—	—
$25,000-$29,999	—	—	—	—
$30,000 or more	100	**	45,300	4
No answer	19,500	37	486,900	41
Total	53,000	100	1,192,800	100
			NORTHERN CUMBERLAND	
Less than $10,000	20,100	39	720,400	47
$10,000-$14,999	4,100	8	162,900	11
$15,000-$19,999	1,100	2	76,500	5
$20,000-$24,999	1,300	2	63,300	4
$25,000-$29,999	—	—	—	—
$30,000 or more	400	1	59,900	4
No answer	25,300	48	445,000	29
Total	52,300	100	1,528,000	100
			SOUTHERN CUMBERLAND	
Less than $10,000	39,100	63	872,200	57
$10,000-$14,999	10,300	16	181,300	12
$15,000-$19,999	1,700	3	69,100	5
$20,000-$24,999	100	**	25,900	2
$25,000-$29,999	—	—	—	—
$30,000 or more	500	1	95,000	6
No answer	10,500	17	276,300	18
Total	62,200	100	1,519,800	100
			BLUEGRASS	
Less than $10,000	22,600	31	281,100	24
$10,000-$14,999	14,200	20	234,600	20
$15,000-$19,999	11,900	16	91,000	8
$20,000-$24,999	1,100	2	75,400	7
$25,000-$29,999	1,400	2	51,100	4
$30,000 or more	1,500	2	75,700	7
No answer	19,900	27	349,600	30
Total	72,600	100	1,158,500	100

CONTINUED

Table 7.—Continued

Income category	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
		PENNYROYAL		
Less than $10,000	38,700	47	788,600	43
$10,000-$14,999	15,600	19	232,800	12
$15,000-$19,999	6,200	8	129,700	7
$20,000-$24,999	3,600	4	85,700	5
$25,000-$29,999	900	1	61,500	3
$30,000 or more	1,300	2	167,100	9
No answer	15,300	19	385,000	21
Total	81,600	100	1,850,400	100
		WESTERN COALFIELD		
Less than $10,000	29,600	37	646,300	44
$10,000-$14,999	23,100	28	317,100	21
$15,000-$19,999	13,400	16	93,500	6
$20,000-$24,999	300	**	43,600	3
$25,000-$29,999	600	1	23,400	2
$30,000 or more	8,100	10	227,600	15
No answer	6,800	8	126,800	9
Total	81,900	100	1,478,300	100
		WESTERN		
Less than $10,000	12,600	54	218,800	47
$10,000-$14,999	600	2	34,600	7
$15,000-$19,999	500	2	28,800	6
$20,000-$24,999	400	2	23,000	5
$25,000-$29,999	600	2	5,800	1
$30,000 or more	2,400	10	51,800	11
No answer	6,500	28	109,400	23
Total	23,600	100	472,200	100
		TOTAL		
Less than $10,000	193,000	45	4,036,800	44
$10,000-$14,999	70,600	17	1,266,000	14
$15,000-$19,999	35,200	8	537,100	6
$20,000-$24,999	6,800	2	316,900	3
$25,000-$29,999	3,500	1	141,800	1
$30,000 or more	14,300	3	722,400	8
No answer	103,800	24	2,179,000	24
Total	427,200	100	9,200,000	100

**Less than 0.5 percent.

Table 8.—Early environment of individual owners, by number of owners, acres of commercial forest land owned, and geographic unit, Kentucky, 1975

Type of environment[a]	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
		EASTERN		
City over 100,000	—	—	—	—
City 10,000 to 99,999	—	—	—	—
Town or city under 10,000	1,000	2	108,500	9
Rural area	24,600	46	289,000	24
On a farm	14,400	27	490,900	41
No answer	13,000	25	304,400	26
Total	53,000	100	1,192,800	100
		NORTHERN CUMBERLAND		
City over 100,000	100	**	21,900	1
City 10,000 to 99,999	900	2	21,900	1
Town or city under 10,000	1,300	2	34,400	2
Rural area	7,600	15	249,700	17
On a farm	16,800	32	841,900	55
No answer	25,600	49	358,200	24
Total	52,300	100	1,528,000	100
		SOUTHERN CUMBERLAND		
City over 100,000	1,900	3	60,400	4
City 10,000 to 99,999	200	**	25,900	2
Town or city under 10,000	900	1	69,100	4
Rural area	18,400	30	354,100	23
On a farm	28,300	46	863,500	57
No answer	12,500	20	146,800	10
Total	62,200	100	1,519,800	100
		BLUEGRASS		
City over 100,000	1,300	2	53,900	5
City 10,000 to 99,999	1,300	2	68,900	6
Town or city under 10,000	2,700	4	56,400	5
Rural area	17,800	24	122,100	10
On a farm	34,200	47	628,500	54
No answer	15,300	21	228,700	20
Total	72,600	100	1,158,500	100

CONTINUED

Table 8.—Continued

Type of environment[a]	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
		PENNYROYAL		
City over 100,000	8,900	11	84,400	5
City 10,000 to 99,999	1,600	2	49,600	3
Town or city under 10,000	9,900	12	111,200	6
Rural area	3,100	4	204,900	11
On a farm	51,100	63	1,225,200	66
No answer	7,000	8	175,100	9
Total	81,600	100	1,850,400	100
		WESTERN COALFIELD		
City over 100,000	700	1	40,500	3
City 10,000 to 99,999	2,200	3	102,100	7
Town or city under 10,000	1,000	1	65,600	4
Rural area	9,300	11	296,900	20
On a farm	60,500	74	850,000	58
No answer	8,200	10	123,200	8
Total	81,900	100	1,478,300	100
		WESTERN		
City over 100,000	*	**	5,800	1
City 10,000 to 99,999	1,100	5	17,300	4
Town or city under 10,000	1,200	5	57,600	12
Rural area	3,500	15	51,800	11
On a farm	16,200	68	316,700	67
No answer	1,600	7	23,000	5
Total	23,600	100	472,200	100
		TOTAL		
City over 100,000	12,900	3	266,900	3
City 10,000 to 99,999	7,300	2	285,700	3
Town or city under 10,000	18,000	4	502,800	5
Rural area	84,300	20	1,568,500	17
On a farm	221,500	52	5,216,700	57
No answer	83,200	19	1,359,400	15
Total	427,200	100	9,200,000	100

[a] First 12 years of life.
* Fewer than 50 owners.
** Less than 0.5 percent.

Table 9.—Estimated number of individual owners of commercial forest land and acres owned, by period of ownership, and geographic unit, Kentucky, 1975

Period of ownership (years)	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
		EASTERN		
Less than 5	18,300	35	108,400	9
5-9	4,800	9	150,500	13
10-24	7,400	14	301,200	25
25-49	6,600	12	370,200	31
Over 50	400	1	39,700	3
No answer	15,500	29	222,800	19
Total	53,000	100	1,192,800	100
		NORTHERN CUMBERLAND		
Less than 5	2,500	5	164,600	11
5-9	7,700	15	154,800	10
10-24	10,300	20	403,400	26
25-49	11,700	22	527,800	35
Over 50	1,100	2	62,400	4
No answer	19,000	36	215,000	14
Total	52,300	100	1,528,000	100
		SOUTHERN CUMBERLAND		
Less than 5	8,300	13	215,900	14
5-9	6,600	11	181,300	12
10-24	15,600	25	345,400	23
25-49	13,000	21	552,700	36
Over 50	5,600	9	60,400	4
No answer	13,100	21	164,100	11
Total	62,200	100	1,519,800	100
		BLUEGRASS		
Less than 5	7,600	10	214,900	19
5-9	13,600	19	150,300	13
10-24	23,900	33	410,100	35
25-49	12,500	17	216,800	19
Over 50	600	1	37,700	3
No answer	14,400	20	128,700	11
Total	72,600	100	1,158,500	100

CONTINUED

Table 9.—Continued

Period of ownership (years)	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
		PENNYROYAL		
Less than 5	17,200	21	272,600	15
5-9	4,100	5	200,600	11
10-24	18,400	23	634,600	34
25-49	19,900	24	487,400	26
Over 50	10,600	13	97,500	5
No answer	11,400	14	157,700	9
Total	81,600	100	1,850,400	100
		WESTERN COALFIELD		
Less than 5	30,300	37	179,000	12
5-9	1,600	2	117,800	8
10-24	15,500	19	491,500	33
25-49	19,300	24	511,900	35
Over 50	13,500	16	119,600	8
No answer	1,700	2	58,500	4
Total	81,900	100	1,478,300	100
		WESTERN		
Less than 5	2,700	11	74,900	16
5-9	1,200	5	51,800	11
10-24	6,300	27	132,500	28
25-49	7,900	34	178,500	38
Over 50	3,800	16	23,000	5
No answer	1,700	7	11,500	2
Total	23,600	100	472,200	100
		TOTAL		
Less than 5	86,900	20	1,230,300	13
5-9	39,600	10	1,007,100	11
10-24	97,400	23	2,718,700	30
25-49	90,900	21	2,845,300	31
Over 50	35,600	8	440,300	5
No answer	76,800	18	958,300	10
Total	427,200	100	9,200,000	100

Table 10.—Distance from owner's residence or place of business to his nearest tract, by number of owners, acres of commercial forest land owned, and geographic unit, Kentucky, 1975

Distance from nearest tract (miles)	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
		EASTERN		
Residence to 1	49,500	82	1,139,200	63
2-5	2,300	4	171,900	10
6-15	500	1	133,200	7
16-25	300	**	30,700	2
26-50	400	1	44,000	2
Over 50	300	**	72,100	4
No answer	6,900	12	209,500	12
Total	60,200	100	1,800,600	100
		NORTHERN CUMBERLAND		
Residence to 1	30,700	57	1,152,100	66
2-5	3,000	6	111,200	6
6-15	700	1	30,500	2
16-25	200	**	25,800	1
26-50	300	1	10,900	1
Over 50	1,400	2	136,900	8
No answer	17,900	33	276,700	16
Total	54,200	100	1,744,100	100
		SOUTHERN CUMBERLAND		
Residence to 1	43,700	66	1,079,400	63
2-5	2,600	4	173,500	10
6-15	2,400	4	173,800	10
16-25	100	**	25,900	1
26-50	300	**	25,900	1
Over 50	4,300	6	120,900	7
No answer	13,600	20	138,200	8
Total	67,000	100	1,737,600	100
		BLUEGRASS		
Residence to 1	54,600	73	827,500	63
2-5	3,400	4	111,800	8
6-15	600	1	80,500	6
16-25	400	1	19,900	2
26-50	700	1	66,800	5
Over 50	100	**	7,400	1
No answer	14,500	20	194,900	15
Total	74,300	100	1,308,800	100

CONTINUED

Table 10.—Continued

Distance from nearest tract (miles)	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
		PENNYROYAL		
Residence to 1	60,900	70	1,312,700	65
2-5	1,600	2	169,200	8
6-15	10,600	12	191,300	9
16-25	2,100	2	60,200	3
26-50	400	**	33,500	2
Over 50	5,100	6	136,600	7
No answer	7,400	8	121,700	6
Total	88,100	100	2,025,200	100
		WESTERN COALFIELD		
Residence to 1	64,300	73	1,186,900	65
2-5	2,800	3	74,200	4
6-15	14,300	16	144,800	8
16-25	500	1	69,300	4
26-50	700	1	49,100	3
Over 50	3,300	4	134,100	7
No answer	1,600	2	160,600	9
Total	87,500	100	1,819,000	100
		WESTERN		
Residence to 1	19,800	81	415,800	73
2-5	900	4	46,100	8
6-15	1,000	4	40,300	7
16-25	200	1	5,800	1
26-50	100	**	11,500	2
Over 50	200	1	11,500	2
No answer	2,100	9	40,300	7
Total	24,300	100	571,300	100
		TOTAL		
Residence to 1	323,500	71	7,113,600	65
2-5	16,600	4	857,900	8
6-15	30,100	6	794,400	7
16-25	3,800	1	237,600	2
26-50	2,900	1	241,700	2
Over 50	14,700	3	619,500	6
No answer	64,000	14	1,141,900	10
Total	455,600	100	11,006,600	100

**Less than 0.5 percent.

Table 11.—Number of tracts of commercial forest land owned, by number of owners, acres owned, and geographic unit, Kentucky, 1975

Number of tracts	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
		EASTERN		
1	50,400	84	1,003,400	56
2	8,800	15	228,700	13
3 or more	1,000	1	568,500	31
Total	60,200	100	1,800,600	100
		NORTHERN CUMBERLAND		
1	47,200	87	1,035,700	59
2	4,500	8	323,300	19
3 or more	2,500	5	385,100	22
Total	54,200	100	1,744,100	100
		SOUTHERN CUMBERLAND		
1	55,400	83	846,300	49
2	7,600	11	388,600	22
3 or more	4,000	6	502,700	29
Total	67,000	100	1,737,600	100
		BLUEGRASS		
1	52,200	70	614,600	47
2	15,900	22	324,000	25
3 or more	6,200	8	370,200	28
Total	74,300	100	1,308,800	100
		PENNYROYAL		
1	68,600	78	981,700	48
2	13,200	15	508,500	25
3 or more	6,300	7	535,000	27
Total	88,100	100	2,025,200	100
		WESTERN COALFIELD		
1	66,100	76	907,700	50
2	17,500	20	409,700	22
3 or more	3,900	4	501,600	28
Total	87,500	100	1,819,000	100
		WESTERN		
1	14,200	58	207,300	36
2	7,300	30	144,000	25
3 or more	2,800	12	220,000	39
Total	24,300	100	571,300	100
		TOTAL		
1	354,100	78	5,596,700	51
2	74,800	16	2,326,800	21
3 or more	26,700	6	3,083,100	28
Total	455,600	100	11,006,600	100

Table 12.—Estimated number of owners of commercial forest land and acres owned, by distance from tracts and number of tracts owned, Kentucky, 1975

Distance (miles)	Distance from nearest tract		Distance from farthest tract				
			1 tract	2 tracts	3 or more tracts	Total	
	Number	*Percent*	*Number*	*Number*	*Number*	*Number*	*Percent*
				OWNERS			
Residence to 1	323,500	71	239,700	35,900	10,300	285,900	63
2-5	16,600	4	11,500	22,700	8,000	42,200	9
6-15	30,100	6	27,300	3,200	3,700	34,200	7
16-25	3,800	1	3,200	1,900	2,100	7,200	2
26-50	2,900	1	1,600	1,800	300	3,700	1
Over 50	14,700	3	12,800	5,000	900	18,700	4
No answer	64,000	14	58,000	4,300	1,400	63,700	14
Total	455,600	100	354,100	74,800	26,700	455,600	100
				ACRES			
Residence to 1	7,113,600	65	3,577,600	752,200	444,000	4,773,800	43
2-5	857,900	8	293,000	834,700	803,800	1,931,500	17
6-15	794,400	7	391,500	236,100	474,300	1,101,900	10
16-25	237,600	2	121,800	105,000	291,100	517,900	5
26-50	241,700	2	123,000	138,700	252,200	513,900	5
Over 50	619,500	6	382,100	137,600	544,000	1,063,700	10
No answer	1,141,900	10	707,700	122,500	273,700	1,103,900	10
Total	11,006,600	100	5,596,700	2,326,800	3,083,100	11,006,600	100

Table 13.—Estimated number of owners of commercial forest land and acres owned, by primary reason for owning and geographic unit, Kentucky, 1975

Reason	Eastern		Northern Cumberland		Southern Cumberland		Bluegrass	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Perc*
				OWNERS				
Land investment	800	1	1,500	3	3,200	5	1,000	
Recreational use	—	—	100	**	700	1	500	
Timber production	1,100	2	800	1	1,200	2	200	
Farm and domestic use	7,900	13	8,000	15	7,200	11	18,300	
Esthetic enjoyment	6,100	10	1,900	4	5,500	8	8,000	
Part of farm	6,700	11	6,200	11	10,200	15	6,800	
Part of residence	26,700	45	9,100	17	17,400	26	18,500	
Other	800	1	1,000	2	6,400	10	2,200	
No answer	10,100	17	25,600	47	15,200	22	18,800	
Total	60,200	100	54,200	100	67,000	100	74,300	1
				ACRES OWNED				
Land investment	157,100	9	131,700	8	285,800	16	96,200	
Recreational use	—	—	30,400	2	34,600	2	29,500	
Timber production	192,300	11	113,000	6	95,000	6	21,800	
Farm and domestic use	130,300	7	370,400	22	293,600	17	280,900	2
Esthetic enjoyment	93,800	5	108,500	6	94,900	5	168,900	1
Part of farm	299,900	17	319,400	18	379,900	22	318,400	2
Part of residence	291,700	16	210,200	12	215,900	12	121,000	
Other	223,600	12	78,200	4	139,300	9	59,400	
No answer	411,900	23	382,300	22	198,600	11	212,700	1
Total	1,800,600	100	1,744,100	100	1,737,600	100	1,308,800	1(
				OWNERS				
Land investment	11,300	13	6,700	8	400	2	24,900	
Recreational use	800	1	*	**	500	2	2,600	
Timber production	3,000	3	7,100	8	1,300	5	14,700	
Farm and domestic use	16,300	18	30,200	35	6,300	26	94,200	2
Esthetic enjoyment	5,900	7	2,200	2	2,800	12	32,400	
Part of farm	32,300	37	33,500	38	7,600	31	103,300	2
Part of residence	6,800	8	3,700	4	3,200	13	85,400	1
Other	1,200	1	3,400	4	100	**	15,100	
No answer	10,500	12	700	1	2,100	9	83,000	1
Total	88,100	100	87,500	100	24,300	100	455,600	10
				ACRES OWNED				
Land investment	371,000	18	334,700	18	40,300	7	1,416,800	1
Recreational use	58,900	3	8,500	1	17,300	3	179,200	
Timber production	211,200	11	161,500	9	145,200	26	940,000	
Farm and domestic use	446,500	22	406,500	22	97,900	17	2,026,100	1
Esthetic enjoyment	97,500	5	92,700	5	51,800	9	708,100	
Part of farm	408,500	20	431,800	24	155,500	27	2,313,400	2
Part of residence	123,000	6	57,900	3	28,800	5	1,048,500	1
Other	104,300	5	211,500	12	5,700	1	822,000	
No answer	204,300	10	113,900	6	28,800	5	1,552,500	1
Total	2,025,200	100	1,819,000	100	571,300	100	11,006,600	10

* Fewer than 50 owners or acres.
** Less than 0.5 percent.

ble 4.—Estimated number of owners who have not harvested timber and acres owned, by primary reason for owning forest land and geographic unit, Kentucky, 1975

Reason	Eastern		Northern Cumberland		Southern Cumberland		Bluegrass	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
anc nvestment	700	1	1,300	3	2,200	4	500	1
ecr tional use	—	—	*	**	700	1	400	1
iml r production	300	1	600	1	300	1	—	—
arn nd domestic use	1,100	2	6,400	15	4,500	9	7,500	14
sth c enjoyment	5,500	13	900	2	4,500	9	6,100	11
art ` farm	5,900	14	4,100	9	7,300	15	4,600	8
art ` residence	20,400	47	6,300	15	15,400	31	18,200	34
the	800	2	900	2	2,000	4	2,200	4
o a wer	8,500	20	23,200	53	13,000	26	14,300	27
To l	43,200	100	43,700	100	49,900	100	53,800	100
				ACRES OWNED				
anc nvestment	74,700	9	74,200	8	121,000	16	48,100	7
ecr tional use	—	—	21,800	2	25,900	3	20,000	3
iml r production	15,300	2	38,900	4	17,300	2	—	—
arn nd domestic use	70,200	8	242,700	26	138,200	18	126,600	17
sth c enjoyment	45,400	5	39,100	4	43,100	6	103,900	14
art ` farm	200,300	24	163,400	17	138,100	18	171,100	24
art ` residence	148,800	18	86,800	9	103,600	13	80,300	11
the	98,300	12	39,000	4	43,200	6	28,200	4
o a wer	180,500	22	245,500	26	138,200	18	143,800	20
To l	833,500	100	951,400	100	768,600	100	722,000	100

Reason	Pennyroyal		Western Coalfield		Western		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
anc nvestment	9,500	15	3,600	6	300	2	18,100	6
ecr tional use	600	1	—	—	400	3	2,100	1
iml r production	1,700	3	4,200	8	600	5	7,700	2
arn nd domestic use	5,900	10	15,900	29	3,900	29	45,200	14
sth c enjoyment	4,400	7	1,100	2	2,200	17	24,700	8
art ` farm	28,100	46	28,300	52	1,900	14	80,200	25
art ` residence	1,700	3	200	**	2,400	18	64,600	20
the	1,100	2	900	2	—	—	7,900	2
lo a wer	8,300	13	300	1	1,600	12	69,200	22
To l	61,300	100	54,500	100	13,300	100	319,700	100
				ACRES OWNED				
anc nvestment	183,100	22	162,900	22	17,300	8	681,300	13
ecr tional use	25,400	3	—	—	11,500	6	104,600	2
iml r production	67,100	8	78,800	11	28,700	14	246,100	5
arn nd domestic use	128,500	16	129,900	18	23,100	11	859,200	17
sth c enjoyment	36,000	4	32,000	4	34,500	17	334,000	7
art ` farm	151,500	19	262,700	35	57,600	28	1,144,700	23
art ` residence	45,400	6	8,500	1	17,300	8	490,700	10
the	70,800	9	42,300	6	—	—	321,800	6
lo a wer	108,100	13	20,200	3	17,300	8	853,600	17
To l	815,900	100	737,300	100	207,300	100	5,036,000	100

Fev r then 50 owners.
L ss than 0.5 percent.

Table 15.—Estimated number of owners who have harvested timber and acres owned, by primary reason for owning forest land and geographic unit, Kentucky, 1975

Reason	Eastern		Northern Cumberland		Southern Cumberland		Bluegrass	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
Land investment	100	1	200	2	1,000	6	500	2
Recreational use	—	—	100	1	*	**	100	1
Timber production	800	5	200	2	900	5	200	1
Farm and domestic use	6,800	40	1,600	15	2,700	16	10,800	3
Esthetic enjoyment	600	3	1,000	10	1,000	6	1,900	9
Part of farm	800	5	2,100	20	2,900	17	2,200	1
Part of residence	6,300	37	2,800	26	2,000	11	300	1
Other	*	**	100	1	4,400	26	*	*
No answer	1,600	9	2,400	23	2,200	13	4,500	2
Total	17,000	100	10,500	100	17,100	100	20,500	0
				ACRES OWNED				
Land investment	82,400	9	57,500	7	164,800	17	48,100	8
Recreational use	—	—	8,600	1	8,700	1	9,500	2
Timber production	177,000	18	74,100	9	77,700	8	21,800	4
Farm and domestic use	60,100	6	127,700	16	155,400	16	154,300	6
Esthetic enjoyment	48,400	5	69,400	9	51,800	5	65,000	1
Part of farm	99,600	10	156,000	20	241,800	25	147,300	5
Part of residence	142,900	15	123,400	16	112,300	12	40,700	7
Other	125,300	13	39,200	5	96,100	10	31,200	5
No answer	231,400	24	136,800	17	60,400	6	68,900	2
Total	967,100	100	792,700	100	969,000	100	586,800	0

Reason	Pennyroyal		Western Coalfield		Western		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
Land investment	1,800	7	3,100	9	100	1	6,800	5
Recreational use	200	1	*	**	100	1	500	*
Timber production	1,300	5	2,900	9	700	6	7,000	5
Farm and domestic use	10,400	39	14,300	43	2,400	22	49,000	6
Esthetic enjoyment	1,500	5	1,100	3	600	5	7,700	6
Part of farm	4,200	16	5,200	16	5,700	52	23,100	7
Part of residence	5,100	19	3,500	11	800	7	20,800	5
Other	100	**	2,500	8	100	1	7,200	6
No answer	2,200	8	400	1	500	5	13,800	0
Total	26,800	100	33,000	100	11,000	100	135,900	0
				ACRES OWNED				
Land investment	187,900	16	171,800	16	23,000	6	735,500	2
Recreational use	33,500	3	8,500	1	5,800	2	74,600	1
Timber production	144,100	12	82,700	8	116,500	32	693,900	2
Farm and domestic use	318,000	26	276,600	25	74,800	20	1,166,900	0
Esthetic enjoyment	61,500	5	60,700	6	17,300	5	374,100	6
Part of farm	257,000	21	169,100	15	97,900	27	1,168,700	0
Part of residence	77,600	6	49,400	5	11,500	3	557,800	9
Other	33,500	3	169,200	15	5,700	2	500,200	8
No answer	96,200	8	93,700	9	11,500	3	698,900	2
Total	1,209,300	100	1,081,700	100	364,000	100	5,970,600	0

* Fewer than 50 owners.
** Less than 0.5 percent.

Table 16.—Primary reason for owning commercial forest land by intention to harvest for all owners, and number of acres owned, Kentucky, 1975

Reason	1 to 10 years		Indefinite		Will never harvest		No answer		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
					OWNERS					
Investment	10,000	2	10,600	2	4,300	1	—	—	24,900	5
Recreational use	800	**	500	**	1,300	**	*	**	2,600	**
Timber production	3,200	1	7,200	1	4,300	1	—	—	14,700	3
Farm and domestic use	14,900	3	46,800	11	32,000	7	500	**	94,200	21
Esthetic	2,300	1	11,600	3	18,500	3	—	—	32,400	7
Part of farm	7,100	1	52,000	12	43,600	10	600	**	103,300	23
Part of residence	9,000	2	20,400	4	53,800	12	2,200	1	85,400	19
Other	1,800	**	4,400	1	8,700	2	200	**	15,100	3
No answer	2,300	1	10,000	2	40,400	10	30,300	6	83,000	19
Total	51,400	11	163,500	36	206,900	46	33,800	7	455,600	100
					ACRES OWNED					
Investment	463,100	4	749,900	7	203,800	2	—	—	1,416,800	13
Recreational use	55,700	1	25,300	**	89,600	1	8,600	**	179,200	2
Timber production	521,700	5	351,100	3	67,200	1	—	—	940,000	9
Farm and domestic use	443,700	4	1,179,100	11	368,700	3	34,600	**	2,026,100	18
Esthetic	113,400	1	259,500	2	335,200	3	—	—	708,100	6
Part of farm	442,700	4	1,190,000	11	636,700	6	44,000	**	2,313,400	21
Part of residence	96,500	1	562,400	6	370,000	3	19,600	**	1,048,500	10
Other	379,700	3	315,900	3	109,700	1	16,700	**	822,000	7
No answer	344,700	3	299,000	2	333,200	3	575,600	6	1,552,500	14
Total	2,861,200	26	4,932,200	45	2,514,100	23	699,100	6	11,006,600	100

* Fewer than 50 owners.
** Less than 0.5 percent.

Table 17.—Benefits derived in the last 5 years and expected in the next 5 years, by number of owners who have harvested timber and number who have not and by acres of commercial forest land owned, Kentucky, 1975

Benefit	Last 5 years				Next 5 years			
	Owners		Commercial forest land owned		Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*	*Number*	*Percent*	*Acres*	*Perc t*
				OWNERS WHO HARVESTED				
Recreational use	3,500	1	150,000	2	1,600	**	91,100	**
Sale of timber	13,100	3	1,111,000	10	9,400	2	831,400	8
Land value increase	11,600	3	1,367,200	12	15,200	3	1,559,300	14
Esthetic enjoyment	37,300	8	755,400	7	28,200	7	795,300	7
Farm and domestic use	47,300	10	1,431,600	13	49,600	11	1,381,500	13
Other	4,000	1	396,500	3	5,700	1	416,400	4
No answer	19,100	4	758,900	7	26,200	6	895,600	8
Total	135,900	30	5,970,600	54	135,900	30	5,970,600	54
				OWNERS WHO HAVE NOT HARVESTED				
Recreational use	14,100	3	248,200	2	8,900	2	157,400	2
Sale of timber	—	—	—	—	4,000	1	140,200	1
Land value increase	25,600	5	1,173,600	11	23,200	5	1,139,400	10
Esthetic enjoyment	52,900	12	922,000	8	52,700	11	938,400	9
Farm and domestic use	115,800	25	1,328,400	12	112,800	25	1,353,300	12
Other	21,200	5	280,600	3	24,700	6	332,800	3
No answer	90,100	20	1,083,200	10	93,400	20	974,500	9
Total	319,700	70	5,036,000	46	319,700	70	5,036,000	46
				ALL OWNERS				
Recreational use	17,600	4	398,200	4	10,500	2	248,500	2
Sale of timber	13,100	3	1,111,000	10	13,400	3	971,600	9
Land value increase	37,200	8	2,540,800	23	38,400	8	2,698,700	24
Esthetic enjoyment	90,200	20	1,677,400	15	80,900	18	1,733,700	16
Farm and domestic use	163,100	35	2,760,000	25	162,400	36	2,734,800	25
Other	25,200	6	677,100	6	30,400	7	749,200	7
No answer	109,200	24	1,842,100	17	119,600	26	1,870,100	17
Total	455,600	100	11,006,600	100	455,600	100	11,006,600	100

** Less than 0.5 percent.

e 18.—Benefits derived in the last 5 years and expected in the next 5 years, by number of owners have harvested timber and number who have not and by acres of commercial forest land owned e EASTERN geographic unit of Kentucky, 1975

Benefit	Last 5 years				Next 5 years			
	Owners		Commercial forest land owned		Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*	*Number*	*Percent*	*Acres*	*Percent*
				OWNERS WHO HARVESTED				
ecreational use	—	—	—	—	—	—	—	—
ale of timber	500	1	280,100	16	300	**	211,200	12
and value increase	700	1	137,400	8	700	1	167,300	9
sthetic enjoyment	6,700	11	99,600	5	7,400	13	153,800	9
arm and domestic use	3,700	6	132,700	7	2,300	4	123,200	7
ther	800	1	88,700	5	500	1	74,100	4
o answer	4,600	8	228,600	13	5,800	9	237,500	13
Total	17,000	28	967,100	54	17,000	28	967,100	54
				OWNERS WHO HAVE NOT HARVESTED				
ecreational use	6,400	11	54,900	3	5,100	8	15,400	1
ale of timber	—	—	—	—	—	—	—	—
and value increase	1,800	3	144,200	8	2,800	5	174,300	10
sthetic enjoyment	3,600	6	147,400	8	6,200	10	211,900	11
arm and domestic use	18,000	30	188,400	11	16,700	28	148,700	8
ther	600	1	54,300	3	600	1	63,100	4
o answer	12,800	21	244,300	13	11,800	20	220,100	12
Total	43,200	72	833,500	46	43,200	72	833,500	46
				ALL OWNERS				
ecreational use	6,400	11	54,900	3	5,100	8	15,400	1
ale of timber	500	1	280,100	16	300	**	211,200	12
and value increase	2,500	4	281,600	16	3,500	6	341,600	19
sthetic enjoyment	10,300	17	247,000	13	13,600	23	365,700	20
arm and domestic use	21,700	36	321,100	18	19,000	32	271,900	15
ther	1,400	2	143,000	8	1,100	2	137,200	8
o answer	17,400	29	472,900	26	17,600	29	457,600	25
Total	60,200	100	1,800,600	100	60,200	100	1,800,600	100

Less than 0.5 percent.

Table 19.—Benefits derived in the last 5 years and expected in the next 5 years, by number of owners who have harvested timber and number who have not and by acres of commercial forest land owned in the NORTHERN CUMBERLAND geographic unit of Kentucky, 1975

Benefit	Last 5 years				Next 5 years			
	Owners		Commercial forest land owned		Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*	*Number*	*Percent*	*Acres*	*Percent*
				OWNERS WHO HARVESTED				
Recreational use	500	1	28,100	1	400	1	19,500	
Sale of timber	1,500	3	85,200	5	600	1	82,900	
Land value increase	1,000	2	174,800	10	1,400	3	200,400	1
Esthetic enjoyment	1,500	3	108,300	6	1,400	3	108,300	
Farm and domestic use	2,600	4	163,500	10	3,600	6	181,600	1
Other	800	2	74,100	4	200	**	54,600	
No answer	2,600	4	158,700	9	2,900	5	145,400	
Total	10,500	19	792,700	45	10,500	19	792,700	4
				OWNERS WHO HAVE NOT HARVESTED				
Recreational use	500	1	28,200	2	500	1	19,600	
Sale of timber	—	—	—	—	1,200	2	50,000	
Land value increase	2,900	5	158,000	9	2,900	5	162,700	
Esthetic enjoyment	5,700	10	148,400	9	4,700	8	124,200	
Farm and domestic use	8,600	17	260,300	14	7,200	14	290,700	1
Other	2,300	4	69,600	4	2,300	5	69,600	
No answer	23,700	44	286,900	17	24,900	46	234,600	1
Total	43,700	81	951,400	55	43,700	81	951,400	5
				ALL OWNERS				
Recreational use	1,000	2	56,300	3	900	2	39,100	
Sale of timber	1,500	3	85,200	5	1,800	3	132,900	
Land value increase	3,900	7	332,800	19	4,300	8	363,100	2
Esthetic enjoyment	7,200	13	256,700	15	6,100	11	232,500	1
Farm and domestic use	11,200	21	423,800	24	10,800	20	472,300	2
Other	3,100	6	143,700	8	2,500	5	124,200	
No answer	26,300	48	445,600	26	27,800	51	380,000	2
Total	54,200	100	1,744,100	100	54,200	100	1,744,100	10

** Less than 0.5 percent.

e 20.—Benefits derived in the last 5 years and expected in the next 5 years, by number of owners h have harvested timber and number who have not and by acres of commercial forest land owned e SOUTHERN CUMBERLAND geographic unit of Kentucky, 1975

Benefit	Last 5 years				Next 5 years			
	Owners		Commercial forest land owned		Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*	*Number*	*Percent*	*Acres*	*Percent*
				OWNERS WHO HARVESTED				
ecreational use	500	1	26,000	2	500	1	17,300	1
le of timber	1,600	2	146,700	8	200	**	43,200	2
nd value increase	3,300	5	285,600	16	3,700	6	311,600	18
thetic enjoyment	6,500	10	120,900	7	7,000	10	146,800	9
rm and domestic use	2,300	4	198,600	11	1,900	3	189,900	11
her	100	**	78,900	5	500	1	113,400	7
answer	2,800	4	112,300	7	3,300	5	146,800	8
Total	17,100	26	969,000	56	17,100	26	969,000	56
				OWNERS WHO HAVE NOT HARVESTED				
ecreational use	3,700	5	43,100	2	600	1	25,900	1
le of timber	—	—	—	—	100	**	8,600	1
nd value increase	4,100	6	164,200	10	2,800	4	146,800	8
thetic enjoyment	5,000	7	112,300	6	9,200	14	138,200	8
rm and domestic use	16,800	25	224,500	13	11,600	17	198,700	11
her	2,600	4	34,500	2	8,100	12	51,800	3
answer	17,700	27	190,000	11	17,500	26	198,600	12
Total	49,900	74	768,600	44	49,900	74	768,600	44
				ALL OWNERS				
ecreational use	4,200	6	69,100	4	1,100	2	43,200	2
le of timber	1,600	2	146,700	8	300	**	51,800	3
nd value increase	7,400	11	449,800	26	6,500	10	458,400	26
thetic enjoyment	11,500	17	233,200	13	16,200	24	285,000	17
rm and domestic use	19,100	29	423,100	24	13,500	20	388,600	22
ther	2,700	4	113,400	7	8,600	13	165,200	10
answer	20,500	31	302,300	18	20,800	31	345,400	20
Total	67,000	100	1,737,600	100	67,000	100	1,737,600	100

' Less than 0.5 percent.

Table 21.—Benefits derived in the last 5 years and expected in the next 5 years, by number of owners who have harvested timber and number who have not and by acres of commercial forest land owned in the PENNYROYAL geographic unit of Kentucky, 1975

Benefit	Last 5 years				Next 5 years			
	Owners		Commercial forest land owned		Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*	*Number*	*Percent*	*Acres*	*Percent*
				OWNERS WHO HARVESTED				
Recreational use	700	1	36,000	2	400	**	26,700	
Sale of timber	4,200	5	218,000	11	2,300	3	108,000	
Land value increase	3,200	4	314,500	16	3,800	4	392,200	2
Esthetic enjoyment	6,000	7	163,200	8	2,000	3	145,900	
Farm and domestic use	9,700	10	358,300	17	14,600	16	371,900	1
Other	100	**	16,200	1	100	**	17,300	
No answer	2,900	3	103,100	5	3,600	4	147,300	
Total	26,800	30	1,209,300	60	26,800	30	1,209,300	6
				OWNERS WHO HAVE NOT HARVESTED				
Recreational use	1,700	2	50,900	2	1,000	2	35,900	
Sale of timber	—	—	—	—	400	*	26,700	
Land value increase	6,600	7	234,100	11	7,200	8	258,300	1
Esthetic enjoyment	7,900	9	156,600	8	7,400	8	123,000	
Farm and domestic use	30,300	35	232,800	12	27,100	31	239,700	1
Other	8,400	10	17,300	1	8,600	10	25,500	
No answer	6,400	7	124,200	6	9,600	11	106,800	
Total	61,300	70	815,900	40	61,300	70	815,900	4
				ALL OWNERS				
Recreational use	2,400	3	86,900	4	1,400	2	62,600	
Sale of timber	4,200	5	218,000	11	2,700	3	134,700	
Land value increase	9,800	11	548,600	27	11,000	12	650,500	3
Esthetic enjoyment	13,900	16	319,800	16	9,400	11	268,900	1
Farm and domestic use	40,000	45	591,100	29	41,700	47	611,600	3
Other	8,500	10	33,500	2	8,700	10	42,800	
No answer	9,300	10	227,300	11	13,200	15	254,100	1
Total	88,100	100	2,025,200	100	88,100	100	2,025,200	10

**Less than 0.5 percent

...e 22.—Benefits derived in the last 5 years and expected in the next 5 years by number of owners ...have harvested timber and number who have not and by acres of commercial forest land owned ...e BLUEGRASS geographic unit of Kentucky, 1975

Benefit	Last 5 years				Next 5 years			
	Owners		Commercial forest land owned		Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*	*Number*	*Percent*	*Acres*	*Percent*
				OWNERS WHO HARVESTED				
...creational use	200	**	19,100	2	100	**	7,300	**
...e of timber	1,000	1	75,900	6	1,300	2	100,300	7
...nd value increase	700	1	110,200	9	1,000	1	105,700	9
...hetic enjoyment	8,400	12	87,100	6	1,900	3	72,400	6
...rm and domestic use	5,200	7	215,300	16	10,500	14	198,900	15
...her	100	**	28,100	2	100	**	40,700	3
...answer	4,900	7	51,100	4	5,600	8	61,500	5
Total	20,500	28	586,800	45	20,500	28	586,800	45
				OWNERS WHO HAVE NOT HARVESTED				
...creational use	300	1	30,300	2	300	**	19,900	2
...e of timber	—	—	—	—	600	1	19,900	2
...nd value increase	2,100	3	109,600	8	1,200	2	71,100	5
...thetic enjoyment	24,500	32	206,700	16	18,400	24	204,800	15
...rm and domestic use	13,500	18	203,400	16	20,000	27	216,600	17
...her	1,000	1	38,600	3	1,200	2	56,300	4
...answer	12,400	17	133,400	10	12,100	16	133,400	10
Total	53,800	72	722,000	55	53,800	72	722,000	55
				ALL OWNERS				
...creational use	500	1	49,400	4	400	**	27,200	2
...e of timber	1,000	1	75,900	6	1,900	3	120,200	9
...nd value increase	2,800	4	219,800	17	2,200	3	176,800	14
...thetic enjoyment	32,900	44	293,800	22	20,300	27	277,200	21
...rm and domestic use	18,700	25	418,700	32	30,500	41	415,500	32
...her	1,100	1	66,700	5	1,300	2	97,000	7
...answer	17,300	24	184,500	14	17,700	24	194,900	15
Total	74,300	100	1,308,800	100	74,300	100	1,308,800	100

*...ess than 0.5 percent.

Table 23.—Benefits derived in the last 5 years and expected in the next 5 years by number of owners who have harvested timber and number who have not and by acres of commercial forest land owned in the WESTERN COALFIELD geographic unit of Kentucky, 1975

Benefit	Last 5 years				Next 5 years			
	Owners		Commercial forest land owned		Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*	*Number*	*Percent*	*Acres*	*Percent*
				OWNERS WHO HARVESTED				
Recreational use	1,500	2	35,100	2	200	**	20,300	
Sale of timber	2,000	2	148,400	8	3,800	4	169,400	1
Land value increase	1,900	2	264,100	14	3,400	4	284,200	1
Esthetic enjoyment	6,800	8	141,700	8	7,000	8	127,800	
Farm and domestic use	18,000	21	299,800	16	13,200	16	246,900	1
Other	1,900	2	99,000	6	1,100	1	99,000	
No answer	900	1	93,600	5	4,300	5	134,100	
Total	33,000	38	1,081,700	59	33,000	38	1,081,700	5
				OWNERS WHO HAVE NOT HARVESTED				
Recreational use	700	1	23,500	1	600	1	23,400	
Sale of timber	—	—	—	—	1,400	2	23,400	
Land value increase	7,900	9	334,700	19	6,100	7	297,500	1
Esthetic enjoyment	3,000	3	87,300	5	3,800	4	78,700	
Farm and domestic use	27,600	31	196,000	11	28,900	32	230,100	1
Other	2,900	4	20,200	1	800	1	32,000	
No answer	12,400	14	75,600	4	12,900	15	52,200	
Total	54,500	62	737,300	41	54,500	62	737,300	4
				ALL OWNERS				
Recreational use	2,200	3	58,600	3	800	1	43,700	
Sale of timber	2,000	2	148,400	8	5,200	6	192,800	1
Land value increase	9,800	11	598,800	33	9,500	11	581,700	3
Esthetic enjoyment	9,800	11	229,000	13	10,800	12	206,500	1
Farm and domestic use	45,600	52	495,800	27	42,100	48	477,000	2
Other	4,800	6	119,200	7	1,900	2	131,000	
No answer	13,300	15	169,200	9	17,200	20	186,300	1
Total	87,500	100	1,819,000	100	87,500	100	1,819,000	10

**Less than 0.5 percent.

e 24.—Benefits derived in the last 5 years and expected in the next 5 years by number of owners have harvested timber and number who have not and by acres of commercial forest land owned e WESTERN geographic unit of Kentucky, 1975

Benefit	Last 5 years				Next 5 years			
	Owners		Commercial forest land owned		Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*	*Number*	*Percent*	*Acres*	*Percent*
				OWNERS WHO HARVESTED				
ecreational use	100	1	5,700	1	—	—	—	—
le of timber	2,300	9	156,700	28	900	4	116,400	21
nd value increase	800	3	80,600	14	1,200	5	97,900	17
thetic enjoyment	1,400	6	34,600	6	1,500	6	40,300	7
rm and domestic use	5,800	24	63,400	11	3,500	14	69,100	12
ther	200	1	11,500	2	3,200	13	17,300	3
o answer	400	1	11,500	2	700	3	23,000	4
Total	11,000	45	364,000	64	11,000	45	364,000	64
				OWNERS WHO HAVE NOT HARVESTED				
ecreational use	800	3	17,300	3	800	3	17,300	3
le of timber	—	—	—	—	300	1	11,600	2
nd value increase	200	1	28,800	5	200	1	28,700	5
thetic enjoyment	3,200	13	63,300	11	3,000	13	57,600	10
rm and domestic use	1,000	4	23,000	4	1,300	5	28,800	5
ther	3,400	14	46,100	8	3,100	13	34,500	6
o answer	4,700	20	28,800	5	4,600	19	28,800	5
Total	13,300	55	207,300	36	13,300	55	207,300	36
				ALL OWNERS				
ecreational use	900	4	23,000	4	800	3	17,300	3
le of timber	2,300	9	156,700	28	1,200	5	128,000	23
nd value increase	1,000	4	109,400	19	1,400	6	126,600	22
thetic enjoyment	4,600	19	97,900	17	4,500	19	97,900	17
rm and domestic use	6,800	28	86,400	15	4,800	19	97,900	17
ther	3,600	15	57,600	10	6,300	26	51,800	9
o answer	5,100	21	40,300	7	5,300	22	51,800	9
Total	24,300	100	571,300	100	24,300	100	571,300	100

Table 25.—Primary benefit expected in the next five years, by intention to harvest, number of owners, and acres of commercial forest land owned, Kentucky, 1975

Benefit	1 to 10 years		Indefinite		Will never harvest		No answer		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
					OWNERS					
Recreational use	1,200	**	2,000	**	7,300	2	*	**	10,500	2
Sale of timber	8,000	2	5,400	1	—	—	—	—	13,400	3
Land value increase	8,700	2	21,300	4	8,200	2	200	**	38,400	8
Esthetic enjoyment	5,700	1	35,600	8	39,500	9	100	**	80,900	18
Farm and domestic use	19,700	4	61,200	14	78,900	18	2,600	**	162,400	36
Other	400	**	9,300	3	20,700	4	—	—	30,400	7
No answer	7,700	2	28,700	6	52,300	11	30,900	7	119,600	26
Total	51,400	11	163,500	36	206,900	46	33,800	7	455,600	100
					ACRES OWNED					
Recreational use	38,200	**	83,800	1	117,800	1	8,700	**	248,500	2
Sale of timber	748,900	7	222,700	2	—	—	—	—	971,600	9
Land value increase	779,000	7	1,481,000	13	424,300	4	14,400	**	2,698,700	24
Esthetic enjoyment	246,400	2	852,200	8	624,200	6	10,900	**	1,733,700	16
Farm and domestic use	505,800	5	1,507,600	14	659,000	6	62,400	**	2,734,800	25
Other	190,300	2	348,600	3	210,300	2	—	—	749,200	7
No answer	352,600	3	436,300	4	478,500	4	602,700	6	1,870,100	17
Total	2,861,200	26	4,932,200	45	2,514,100	23	699,100	6	11,006,600	100

* Fewer than 50 owners.
** Less than 0.5 percent.

ıble 26.—Reason for harvesting, by ownership group, number of owners, and acres of commercial forest land owned, Kentucky, 1975

Reason	Individuals[a]		Corporations		Other[b]		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
Timber mature	18,100	14	100	9	400	4	18,600	14
Good price	16,600	13	*	**	1,500	17	18,100	13
Land clearing	9,400	7	1,000	91	2,600	30	13,000	10
Need of money	30,700	25	—	—	2,700	31	33,400	24
Timber salvage	4,900	4	*	**	200	2	5,100	4
Own or company use	38,500	31	*	**	1,200	13	39,700	29
No answer	7,700	6	*	**	300	3	8,000	6
Total	125,900	100	1,100	100	8,900	100	135,900	100
				ACRES OWNED				
Timber mature	991,900	21	275,000	31	76,000	18	1,342,900	22
Good price	568,600	12	53,300	6	75,400	18	697,300	13
Land clearing	337,500	7	142,900	16	26,700	6	507,100	8
Need of money	1,220,500	27	—	—	101,600	25	1,322,100	22
Timber salvage	385,300	8	72,400	8	11,700	3	469,400	8
Own or company use	796,100	17	327,500	37	89,700	21	1,213,300	20
No answer	356,200	8	22,700	2	39,600	9	418,500	7
Total	4,656,100	100	893,800	100	420,700	100	5,970,600	100

[a] Includes joint ownerships.
[b] Includes partnerships, undivided estates, clubs, associations, etc.
* Fewer than 50 owners.
** Less than 0.5 percent.

Table 27.—Reason for harvesting, by number of owners, acres of commercial forest land owned, and geographic units, Kentucky, 1975

Reason	Eastern		Northern Cumberland		Southern Cumberland		Bluegrass	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Per nt*
				OWNERS				
Timber mature	1,200	7	1,200	11	1,700	10	500	
Good price	3,300	19	1,000	9	1,000	6	5,400	2
Land clearing	300	2	600	6	1,800	10	800	
Need of money	4,300	25	2,800	27	7,600	44	1,600	
Timber salvage	300	2	700	7	1,500	9	200	
Own or company use	5,800	34	2,500	24	2,000	12	10,500	5
No answer	1,800	11	1,700	16	1,500	9	1,500	
Total	17,000	100	10,500	100	17,100	100	20,500	10
				ACRES OWNED				
Timber mature	274,200	28	118,500	15	182,100	19	71,000	1
Good price	107,900	11	56,100	7	130,600	14	82,800	1
Land clearing	15,400	2	56,100	7	95,000	10	46,400	
Need of money	200,300	21	210,900	27	285,000	29	99,700	1
Timber salvage	88,100	9	62,200	8	77,700	8	39,600	
Own or company use	241,600	25	175,600	22	120,900	12	191,000	3
No answer	39,600	4	113,300	14	77,700	8	56,300	
Total	967,100	100	792,700	100	969,000	100	586,800	10

Reason	Pennyroyal		Western Coalfield		Western		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Per nt*
				OWNERS				
Timber mature	4,400	16	4,100	12	5,500	50	18,600	1
Good price	4,400	16	2,400	7	600	5	18,100	1
Land clearing	1,600	6	5,700	17	2,200	20	13,000	1
Need of money	5,400	20	10,600	33	1,100	10	33,400	2
Timber salvage	1,700	7	500	2	200	2	5,100	
Own or company use	8,500	32	9,300	28	1,100	10	39,700	2
No answer	800	3	400	1	300	3	8,000	
Total	26,800	100	33,000	100	11,000	100	135,900	10
				ACRES OWNED				
Timber mature	326,900	28	226,200	21	144,000	40	1,342,900	2
Good price	150,900	12	134,500	12	34,500	9	697,300	1
Land clearing	77,600	6	205,100	19	11,500	3	507,100	
Need of money	264,500	22	204,100	19	57,600	16	1,322,100	2
Timber salvage	132,300	11	52,200	5	17,300	5	469,400	
Own or company use	186,300	15	227,600	21	70,300	19	1,213,300	2
No answer	70,800	6	32,000	3	28,800	8	418,500	
Total	1,209,300	100	1,081,700	100	364,000	100	5,970,600	10

Table 28.—Reason for not harvesting, by ownership groups, number of owners, and acres of commercial forest land owned, Kentucky, 1975

Reason	Individual[a]		Corporation		Other[b]		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
ımature	116,500	39	600	40	2,900	17	120,000	38
o market	2,500	1	—	—	—	—	2,500	1
ice too low	7,700	3	—	—	—	—	7,700	2
estroy hunting	1,300	**	—	—	3,400	20	4,700	1
elling the land	1,600	**	*	**	1,000	6	2,600	1
uin scenery	11,700	4	400	27	5,300	31	17,400	5
and in estate	200	**	—	—	1,600	10	1,800	1
istrust loggers	4,200	1	—	—	—	—	4,200	1
pposed to harvest	2,200	1	—	—	—	—	2,200	1
oor quality	5,200	2	—	—	200	1	5,400	2
ow volume	27,900	9	—	—	500	3	28,400	9
re hazard	500	**	—	—	—	—	500	**
ısufficient area	10,200	3	—	—	—	—	10,200	3
ther	47,100	16	300	20	1,800	11	49,200	15
o answer	62,500	21	200	13	200	1	62,900	20
Total	301,300	100	1,500	100	16,900	100	319,700	100
				ACRES OWNED				
nmature	1,609,700	35	39,500	30	91,500	25	1,740,700	34
o market	55,700	1	—	—	—	—	55,700	1
rice too low	363,500	8	—	—	—	—	363,500	7
estory hunting	94,500	2	—	—	36,800	10	131,300	3
elling the land	50,200	1	17,200	13	9,300	3	76,700	2
uin scenery	216,900	5	15,300	12	29,800	8	262,000	5
and in estate	14,400	**	—	—	102,100	28	116,500	2
istrust loggers	131,900	3	—	—	—	—	131,900	3
pposed to harvest	99,000	2	—	—	—	—	99,000	2
oor quality	158,200	3	—	—	19,100	5	177,300	4
ow volume	472,100	10	—	—	10,400	3	482,500	9
ire hazard	27,700	1	—	—	—	—	27,700	1
nsufficient area	58,100	1	—	—	—	—	58,100	1
ther	484,800	11	46,300	36	36,400	10	567,500	11
lo answer	707,400	17	11,700	9	26,500	8	745,600	15
Total	4,544,100	100	130,000	100	361,900	100	5,036,000	100

[a] Includes joint ownerships.
[b] Includes partnerships, undivided estates, clubs, associations, etc.
Fewer than 50 owners.
* Less than 0.5 percent.

Table 29.—Reason for not harvesting, by number of owners, acres of commercial forest land owned, and geographic units, Kentucky, 1975

Reason	Eastern		Northern Cumberland		Southern Cumberland		Bluegrass	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Pe*
				OWNERS				
Immature	8,200	19	8,000	19	23,400	48	24,000	
No market	1,000	2	100	**	1,200	2	200	
Price too low	400	1	1,500	3	1,300	3	500	
Destroy hunting	100	**	300	1	3,200	6	—	
Selling the land	—	—	500	1	—	—	400	
Ruin scenery	6,000	14	3,200	7	100	**	1,900	
Land in estate	1,100	3	400	1	200	**	—	
Distrust loggers	500	1	*	**	—	—	500	
Opposed to harvest	—	—	800	2	400	1	200	
Poor quality	—	—	1,300	3	2,900	6	400	
Low volume	1,700	4	1,800	4	8,800	18	2,600	
Fire hazard	—	—	—	—	200	**	300	
Insufficient area	—	—	4,300	10	—	—	3,600	
Other	15,200	35	4,500	10	1,000	2	6,900	
No answer	9,000	21	17,000	39	7,200	14	12,300	
Total	43,200	100	43,700	100	49,900	100	53,800	1
				ACRES OWNED				
Immature	306,300	37	230,600	24	302,300	40	194,900	
No market	15,400	2	10,900	1	8,600	1	20,800	
Price too low	14,700	2	93,700	10	51,800	7	41,600	
Destroy hunting	15,400	2	32,800	4	25,900	3	—	
Selling the land	—	—	28,100	3	8,700	1	10,400	
Ruin scenery	46,000	5	36,800	4	17,300	2	52,100	
Land in estate	79,200	9	17,200	2	8,600	1	—	
Distrust loggers	14,700	2	10,900	1	8,600	1	38,600	
Opposed to harvest	—	—	38,900	4	17,200	2	10,400	
Poor quality	—	—	50,100	5	51,800	7	31,200	
Low volume	39,600	5	114,400	12	103,600	14	82,300	1
Fire hazard	—	—	—	—	17,300	2	10,400	
Insufficient area	—	—	8,600	1	—	—	22,700	
Other	97,600	12	69,600	7	69,100	9	94,000	1
No answer	204,600	24	208,800	22	77,800	10	112,600	1
Total	833,500	100	951,400	100	768,600	100	722,000	10

CONTIN ED

29.—Continued

Reason	Pennyroyal		Western Coalfield		Western		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
nature	35,400	58	19,500	36	1,500	11	120,000	38
market	—	—	—	—	—	—	2,500	1
ce too low	1,100	2	2,600	5	300	2	7,700	2
stroy hunting	600	1	300	1	200	2	4,700	1
ling the land	900	1	800	1	—	—	2,600	1
in scenery	3,400	6	600	1	2,200	16	17,400	5
nd in estate	—	—	—	—	100	1	1,800	1
trust loggers	2,600	4	600	1	—	—	4,200	1
posed to harvest	700	1	—	—	100	1	2,200	1
or quality	100	**	500	1	200	2	5,400	2
w volume	7,500	12	3,700	7	2,300	17	28,400	9
e hazard	—	—	—	—	—	—	500	**
ufficient area	1,100	2	600	1	600	5	10,200	3
ner	4,400	7	13,300	24	3,900	29	49,200	15
answer	3,500	6	12,000	22	1,900	14	62,900	20
Total	61,300	100	54,500	100	13,300	100	319,700	100
				ACRES OWNED				
mature	309,200	39	357,100	48	40,300	19	1,740,700	34
market	—	—	—	—	—	—	55,700	1
ce too low	60,200	7	84,200	11	17,300	8	363,500	7
stroy hunting	25,500	3	20,200	3	11,500	6	131,300	3
ling the land	9,300	1	20,200	3	—	—	76,700	2
in scenery	52,200	6	28,800	4	28,800	14	262,000	5
nd in estate	—	—	—	—	11,500	6	116,500	2
trust loggers	41,600	5	11,700	2	5,800	3	131,900	3
posed to harvest	26,700	3	—	—	5,800	3	99,000	2
or quality	9,300	1	23,400	3	11,500	6	177,300	4
w volume	61,500	8	63,900	8	17,200	8	482,500	9
e hazard	—	—	—	—	—	—	27,700	1
ufficient area	9,300	1	11,700	2	5,800	3	58,100	1
ner	121,700	15	81,000	11	34,500	16	567,500	11
answer	89,400	11	35,100	5	17,300	8	745,600	15
Total	815,900	100	737,300	100	207,300	100	5,036,000	100

wer than 50 owners.
ess than 0.5 percent.

Table 30.—Expected time of future timber harvest, by number of owners and acres owned, for owners who have previously harvested and owners who have not, Kentucky, 1975

Expected time	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
	OWNERS WHO HARVESTED			
0-5 years	21,900	5	1,611,100	14
5-10 years	5,800	1	525,100	5
Indefinite	62,400	14	2,621,300	24
Will never harvest	40,800	9	950,000	9
No answer	5,000	1	263,100	2
Total	135,900	30	5,970,600	54
	OWNERS WHO HAVE NOT HARVESTED			
0-5 years	14,300	3	375,700	4
5-10 years	9,400	2	349,200	3
Indefinite	101,100	22	2,311,000	21
Will never harvest	166,100	37	1,564,100	14
No answer	28,800	6	436,000	4
Total	319,700	70	5,036,000	46
	ALL OWNERS			
0-5 years	36,200	8	1,986,800	18
5-10 years	15,200	3	874,300	8
Indefinite	163,500	36	4,932,300	45
Will never harvest	206,900	46	2,514,100	23
No answer	33,800	7	699,100	6
Total	455,600	100	11,006,600	100

Table 31.—Expected time of future timber harvest, by number of owners and acres owned, for owners who have previously harvested and owners who have not, in the EASTERN geographic unit of Kentucky, 1975

Expected time	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
	OWNERS WHO HARVESTED			
0-5 years	800	1	431,400	24
5-10 years	*	**	27,000	2
Indefinite	12,000	20	282,800	16
Will never harvest	4,000	7	210,500	11
No answer	200	**	15,400	1
Total	17,000	28	967,100	54
	OWNERS WHO HAVE NOT HARVESTED			
0-5 years	1,000	2	60,000	3
5-10 years	—	—	—	—
Indefinite	7,200	12	351,100	19
Will never harvest	27,800	46	280,800	16
No answer	7,200	12	141,600	8
Total	43,200	72	833,500	46
	ALL OWNERS			
0-5 years	1,800	3	491,400	27
5-10 years	*	**	27,000	2
Indefinite	19,200	32	633,900	35
Will never harvest	31,800	53	491,300	27
No answer	7,400	12	157,000	9
Total	60,200	100	1,800,600	100

*Fewer than 50 owners.
**Less than 0.5 percent.

Table 32.—Expected time of future timber harvest, by number of owners and acres owned, for owners who have previously harvested and owners who have not, in the NORTHERN CUMBERLAND geographic unit of Kentucky, 1975

Expected time	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
	OWNERS WHO HARVESTED			
0-5 years	700	1	176,800	10
5-10 years	300	**	41,400	3
Indefinite	4,000	8	290,100	16
Will never harvest	4,000	8	193,000	11
No answer	1,500	2	91,400	5
Total	10,500	19	792,700	45
	OWNERS WHO HAVE NOT HARVESTED			
0-5 years	1,100	2	52,400	3
5-10 years	400	1	56,300	3
Indefinite	11,200	21	444,800	26
Will never harvest	19,100	35	263,400	15
No answer	11,900	22	134,500	8
Total	43,700	81	951,400	55
	ALL OWNERS			
0-5 years	1,800	3	229,200	13
5-10 years	700	1	97,700	6
Indefinite	15,200	28	734,900	42
Will never harvest	23,100	43	456,400	26
No answer	13,400	25	225,900	13
Total	54,200	100	1,744,100	100

**Less than 0.5 percent.

Table 33.—Expected time of future timber harvest, by number of owners and acres owned, for owners who have previously harvested and owners who have not, in the SOUTHERN CUMBERLAND geographic unit of Kentucky, 1975

Expected time	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
	OWNERS WHO HARVESTED			
0-5 years	1,800	3	164,800	9
5-10 years	600	1	86,400	5
Indefinite	6,600	10	536,500	31
Will never harvest	6,600	10	129,500	8
No answer	1,500	2	51,800	3
Total	17,100	26	969,000	56
	OWNERS WHO HAVE NOT HARVESTED			
0-5 years	4,400	6	51,800	3
5-10 years	100	**	8,600	1
Indefinite	17,200	26	371,300	21
Will never harvest	27,100	40	302,300	17
No answer	1,100	2	34,600	2
Total	49,900	74	768,600	44
	ALL OWNERS			
0-5 years	6,200	9	216,600	12
5-10 years	700	1	95,000	6
Indefinite	23,800	36	907,800	52
Will never harvest	33,700	50	431,800	25
No answer	2,600	4	86,400	5
Total	67,000	100	1,737,600	100

**Less than 0.5 percent.

Table 34.—Expected time of future timber harvest, by number of owners and acres owned, for owners who have previously harvested and owners who have not, in the BLUEGRASS geographic unit of Kentucky, 1975

Expected time	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
	OWNERS WHO HARVESTED			
0-5 years	1,000	1	120,200	9
5-10 years	1,100	2	105,700	8
Indefinite	6,300	8	255,200	20
Will never harvest	10,800	15	74,500	6
No answer	1,300	2	31,200	2
Total	20,500	28	586,800	45
	OWNERS WHO HAVE NOT HARVESTED			
0-5 years	2,900	4	59,400	5
5-10 years	2,300	3	83,200	6
Indefinite	12,400	16	276,100	21
Will never harvest	29,500	40	231,400	17
No answer	6,700	9	71,900	6
Total	53,800	72	722,000	55
	ALL OWNERS			
0-5 years	3,900	5	179,600	14
5-10 years	3,400	5	188,900	14
Indefinite	18,700	24	531,300	41
Will never harvest	40,300	55	305,900	23
No answer	8,000	11	103,100	8
Total	74,300	100	1,308,800	100

Table 35.—Expected time of future timber harvest, by number of owners and acres owned, for owners who have previously harvested and owners who have not, in the PENNYROYAL geographic unit of Kentucky, 1975

Expected time	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
	OWNERS WHO HARVESTED			
0-5 years	10,900	12	252,400	12
5-10 years	600	1	116,200	6
Indefinite	12,600	14	658,800	33
Will never harvest	2,500	3	137,800	7
No answer	200	**	44,100	2
Total	26,800	30	1,209,300	60
	OWNERS WHO HAVE NOT HARVESTED			
0-5 years	3,600	4	85,600	4
5-10 years	3,000	4	78,900	4
Indefinite	17,200	20	381,300	18
Will never harvest	35,600	40	216,700	11
No answer	1,900	2	53,400	3
Total	61,300	70	815,900	40
	ALL OWNERS			
0-5 years	14,500	16	338,000	16
5-10 years	3,600	5	195,100	10
Indefinite	29,800	34	1,040,100	51
Will never harvest	38,100	43	354,500	18
No answer	2,100	2	97,500	5
Total	88,100	100	2,025,200	100

**Less than 0.5 percent.

Table 36.—Expected time of future harvest, by number of owners and acres owned, for owners who have previously harvested and owners who have not, in the WESTERN COALFIELD geographic unit of Kentucky, 1975

Expected time	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
	OWNERS WHO HARVESTED			
0-5 years	5,400	6	326,100	18
5-10 years	2,900	3	125,400	7
Indefinite	13,500	16	459,700	25
Will never harvest	11,000	13	147,100	8
No answer	200	**	23,400	1
Total	33,000	38	1,081,700	59
	OWNERS WHO HAVE NOT HARVESTED			
0-5 years	1,300	2	60,700	3
5-10 years	3,300	4	110,700	6
Indefinite	29,200	33	354,000	20
Will never harvest	20,700	23	211,900	12
No answer	—	—	—	—
Total	54,500	62	737,300	41
	ALL OWNERS			
0-5 years	6,700	8	386,800	21
5-10 years	6,200	7	236,100	13
Indefinite	42,700	49	813,700	45
Will never harvest	31,700	36	359,000	20
No answer	200	**	23,400	1
Total	87,500	100	1,819,000	100

**Less than 0.5 percent.

Table 37.—Expected time of future timber harvest, by number of owners and acres owned, for owners who have previously harvested and owners who have not, in the WESTERN geographic unit of Kentucky, 1975

Expected time	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
	OWNERS WHO HARVESTED			
0-5 years	1,300	5	139,400	25
5-10 years	300	1	23,000	4
Indefinite	7,400	30	138,200	24
Will never harvest	1,900	8	57,600	10
No answer	100	1	5,800	1
Total	11,000	45	364,000	64
	OWNERS WHO HAVE NOT HARVESTED			
0-5 years	—	—	5,800	1
5-10 years	300	1	11,500	2
Indefinite	6,700	28	132,400	23
Will never harvest	6,300	26	57,600	10
No answer	—	—	—	—
Total	13,300	55	207,300	36
	ALL OWNERS			
0-5 years	1,300	5	145,200	26
5-10 years	600	2	34,500	6
Indefinite	14,100	58	270,600	47
Will never harvest	8,200	34	115,200	20
No answer	100	1	5,800	1
Total	24,300	100	571,300	100

Table 38.—Expected time of future timber harvest, by size class of ownership, number of owners, and acres of commercial forest land owned, Kentucky, 1975

Size class (acres)	0 to 10 years		Indefinite		Will never harvest		No answer		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
					OWNERS					
1-9	16,000	3	73,400	16	153,200	34	18,400	4	261,000	57
10-19	11,900	3	27,000	6	14,700	3	4,500	1	58,100	13
20-49	13,300	3	35,200	8	26,000	5	7,700	2	82,200	18
50-99	5,500	1	17,400	4	9,100	3	2,500	**	34,500	8
100-199	2,900	1	7,000	1	3,400	1	400	**	13,700	3
200-499	1,400	**	3,000	1	500	**	200	**	5,100	1
500-999	300	**	300	**	*	**	100	**	700	**
1,000+	100	**	200	**	*	**	*	**	300	**
Total	51,400	11	163,500	36	206,900	46	33,800	7	455,600	100
					ACRES OWNED					
1-9	61,800	1	304,400	3	364,200	3	75,500	1	805,900	8
10-19	151,000	1	328,900	3	189,600	2	58,300	**	727,800	6
20-49	389,000	4	1,054,100	9	763,800	7	215,300	2	2,422,200	22
50-99	363,800	3	1,091,500	10	577,700	5	181,400	2	2,214,400	20
100-199	376,200	3	857,000	8	430,600	5	56,500	**	1,720,300	16
200-499	398,700	4	792,100	7	140,700	1	77,500	1	1,409,000	13
500-999	202,300	2	192,900	2	9,500	**	17,300	**	422,000	4
1,000+	918,400	8	311,300	3	38,000	**	17,300	**	1,285,000	11
Total	2,861,200	26	4,932,200	45	2,514,100	23	699,100	6	11,006,600	100

* Fewer than 50 owners.
** Less than 0.5 percent.

Table 39.—Person chosing timber to be harvested, by number of owners, acres of commercial forest land owned, and geographic units, Kentucky, 1975

Individual selecting timber	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
		EASTERN		
Landowner	10,500	62	407,700	42
Forester	*	**	126,000	13
Buyer	700	4	141,300	15
Landowner and forester	—	—	—	—
Landowner and buyer	*	**	30,700	3
Other	*	**	66,000	7
No answer	5,800	34	195,400	20
Total	17,000	100	967,100	100
		NORTHERN CUMBERLAND		
Landowner	6,500	62	431,800	55
Forester	200	2	44,000	6
Buyer	1,600	15	114,800	14
Landowner and forester	*	**	35,000	5
Landowner and buyer	300	3	19,600	2
Other	300	3	25,600	3
No answer	1,600	15	121,900	15
Total	10,500	100	792,700	100
		SOUTHERN CUMBERLAND		
Landowner	6,800	40	466,300	48
Forester	500	3	43,900	5
Buyer	7,200	42	293,600	30
Landowner and forester	*	**	8,700	1
Landowner and buyer	200	1	52,900	5
Other	—	—	—	—
No answer	2,400	14	103,600	11
Total	17,100	100	969,000	100
		BLUEGRASS		
Landowner	6,500	32	259,500	44
Forester	300	2	47,200	8
Buyer	5,800	28	114,800	20
Landowner and forester	200	1	30,100	5
Landowner and buyer	100	**	27,300	5
Other	800	4	19,100	3
No answer	6,800	33	88,800	15
Total	20,500	100	586,800	100
		PENNYROYAL		
Landowner	15,600	58	685,000	56
Forester	100	**	18,300	2
Buyer	7,700	29	322,900	27
Landowner and forester	*	**	26,700	2
Landowner and buyer	2,100	8	78,800	7
Other	200	1	16,100	1
No answer	1,100	4	61,500	5
Total	26,800	100	1,209,300	100

CONTINUED

Table 39.—Continued

Individual selecting timber	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
		WESTERN COALFIELD		
Landowner	18,500	56	492,400	45
Forester	400	2	62,500	6
Buyer	11,600	35	311,700	29
Landowner and forester	*	**	8,600	1
Landowner and buyer	400	1	60,700	6
Other	1,500	4	43,600	4
No answer	600	2	102,200	9
Total	33,000	100	1,081,700	100
		WESTERN		
Landowner	4,400	40	144,000	39
Forester	500	4	64,600	17
Buyer	5,500	50	103,600	28
Landowner and forester	100	1	5,700	2
Landowner and buyer	100	1	17,300	5
Other	100	1	11,500	4
No answer	300	3	17,300	5
Total	11,000	100	364,000	100
		TOTAL		
Landowner	68,800	51	2,886,700	48
Forester	2,000	1	406,500	7
Buyer	40,100	30	1,402,700	23
Landowner and forester	300	**	114,800	2
Landowner and buyer	3,200	2	287,300	5
Other	2,900	2	181,900	3
No answer	18,600	14	690,700	12
Total	135,900	100	5,970,600	100

*Fewer than 50 owners.
**Less than 0.5 percent.

Table 40.—Method of selecting timber to be harvested, by number of owners, acres of commercial forest land owned, and geographic units, Kentucky, 1975

Method of selecting timber	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
		EASTERN		
Selection	1,300	8	106,200	11
Diameter limit	1,500	9	304,600	31
Clearcutting	1,500	9	48,500	5
Land clearing	1,900	11	54,200	6
Combination of methods	*	**	182,700	19
Other	600	4	54,300	6
Don't know	4,000	23	78,500	8
No answer	6,200	36	138,100	14
Total	17,000	100	967,100	100
		NORTHERN CUMBERLAND		
Selection	1,800	17	140,400	18
Diamter limit	2,200	21	194,300	24
Clearcutting	1,100	10	78,800	10
Land clearing	900	9	84,100	11
Combination of methods	500	5	47,500	6
Other	700	7	41,400	5
Don't know	1,500	14	78,200	10
No answer	1,800	17	128,000	16
Total	10,500	100	792,700	100
		SOUTHERN CUMBERLAND		
Selection	1,300	8	146,800	15
Diameter limit	4,300	5	390,400	40
Clearcutting	500	3	51,800	5
Land clearing	1,800	11	86,400	9
Combination of methods	200	1	17,300	2
Other	6,000	35	103,600	11
Don't know	600	3	51,800	5
No answer	2,400	14	120,900	13
Total	17,100	100	969,000	100
		BLUEGRASS		
Selection	1,000	4	129,500	22
Diameter limit	9,400	46	164,200	29
Clearcutting	200	1	29,500	5
Land clearing	1,300	7	48,100	8
Combination of methods	600	3	36,800	6
Other	600	3	24,300	4
Don't know	400	2	42,900	7
No answer	7,000	34	111,500	19
Total	20,500	100	586,800	100

CONTINUED

Table 40.—Continued

Method of selecting timber	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
		PENNYROYAL		
Selection	9,400	35	209,900	17
Diameter limit	6,500	24	413,900	34
Clearcutting	2,600	10	186,900	16
Land clearing	900	3	50,900	4
Combination of methods	1,500	6	96,200	8
Other	2,200	8	92,500	8
Don't know	2,300	9	70,800	6
No answer	1,400	5	88,200	7
Total	26,800	100	1,209,300	100
		WESTERN COALFIELD		
Selection	4,800	15	202,200	18
Diameter limit	14,200	43	379,800	35
Clearcutting	1,400	4	72,400	7
Land clearing	6,900	21	181,700	17
Combination of methods	200	1	99,000	9
Other	—	—	—	—
Don't know	4,100	12	82,700	8
No answer	1,400	4	63,900	6
Total	33,000	100	1,081,700	100
		WESTERN		
Selection	2,400	22	103,700	28
Diameter limit	3,300	30	115,200	33
Clearcutting	4,600	42	51,800	14
Land clearing	—	—	—	—
Combination of methods	100	1	41,500	11
Other	*	**	11,500	3
Don't know	100	1	11,500	3
No answer	500	4	28,800	8
Total	11,000	100	364,000	100
		TOTAL		
Selection	22,000	16	1,038,700	17
Diameter	41,400	31	1,962,400	34
Clearcutting	11,900	9	519,700	9
Land clearing	13,700	10	505,400	8
Combination of methods	3,100	2	521,000	9
Other	10,100	7	327,600	5
Don't know	13,000	10	416,400	7
No answer	20,700	15	679,400	11
Total	135,900	100	5,970,600	100

*Fewer than 50 owners.
**Less than 0.5 percent.

Table 41.—Person choosing timber to be harvested, by method of selecting timber, number of owners, and acres of commercial forest land owned, Kentucky, 1975

Individual selecting timber	Selection	Diameter limit	Clearcutting	Land clearing		Don't know	Total	
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Percent*
				OWNERS				
Landowner	15,500	25,200	5,700	8,600	6,700	7,100	68,800	51
Forester	1,300	100	*	200	400	—	2,000	1
Buyer	3,000	14,700	6,200	4,400	7,300	4,500	40,100	30
Landowner and forester	100	100	*	—	100	*	300	**
Landowner and buyer	700	600	*	200	700	1,000	3,200	2
Other[b]	1,400	700	—	*	700	100	2,900	2
No answer	—	*	—	300	18,000	300	18,600	14
Total	22,000	41,400	11,900	13,700	33,900	13,000	135,900	100
				ACRES OWNED				
Landowner	599,200	968,500	293,800	382,700	419,000	223,500	2,886,700	48
Forester	179,100	154,200	11,700	17,000	44,500	—	406,500	7
Buyer	190,100	655,900	167,500	34,300	225,900	129,000	1,402,700	23
Landowner and forester	10,400	13,800	35,000	—	47,000	8,600	114,800	2
Landowner and buyer	43,300	125,600	11,700	16,700	66,300	23,700	287,300	5
Other[b]	16,600	35,100	—	23,400	92,500	14,300	181,900	3
No answer	—	9,300	—	31,300	632,800	17,300	690,700	12
Total	1,038,700	1,962,400	519,700	505,400	1,528,000	416,400	5,970,600	100

* Fewer than 50 owners.
** Less than 0.5 percent.
[a] Includes combination of methods.
[b] Includes friend and other combinations of people.

Table 42.—Timber harvested, by product, number of owners, acres of commercial forest land owned, and geographic unit, Kentucky, 1975

Product	Eastern		Northern Cumberland		Southern Cumberland		Bluegrass	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
Sawlogs	9,500	56	6,000	57	11,000	64	5,800	29
Veneer logs	—	—	600	6	100	1	5,100	25
Pulpwood	—	—	300	3	500	3	—	—
Posts, poles, pilings	—	—	300	3	—	—	3,600	18
One other product	1,300	7	100	1	200	1	300	1
Sawlogs and veneer	100	1	700	6	500	3	*	**
Sawlogs and pulpwood	—	—	200	2	1,600	9	200	1
Sawlogs & posts, poles, piling	—	—	100	1	100	1	2,500	12
Other two product combination	300	2	100	1	500	3	100	—
Three product combination	*	**	100	1	200	1	200	1
Four or more products	*	**	—	—	100	1	—	—
Don't know	—	—	200	2	300	2	100	—
No answer	5,800	34	1,800	17	2,000	11	2,600	13
Total	17,000	100	10,500	100	17,100	100	20,500	100
				ACRES OWNED				
Sawlogs	443,700	46	417,600	53	554,500	57	215,800	37
Veneer logs	—	—	34,000	4	25,900	3	65,900	11
Pulpwood	—	—	21,900	3	34,500	4	—	—
Posts, poles, pilings	—	—	28,000	4	—	—	27,300	4
One other product	39,600	4	8,600	1	17,300	2	26,400	4
Sawlogs and veneer	24,200	3	47,500	6	43,200	4	28,200	5
Sawlogs and pulpwood	—	—	76,500	10	60,500	6	9,500	2
Sawlogs & posts, poles, pilings	—	—	8,600	1	25,900	3	91,800	16
Other two product combination	66,600	7	8,600	1	34,500	3	10,400	2
Three product combination	58,000	6	10,900	1	34,500	3	30,300	5
Four or more products	139,600	14	—	—	25,900	3	9,500	2
Don't know	—	—	17,200	2	25,900	3	10,400	2
No answer	195,400	20	113,300	14	86,400	9	61,300	10
Total	967,100	100	792,700	100	969,000	100	586,800	100

Product	Pennyroyal		Western Coalfield		Western		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
Sawlogs	13,800	52	21,500	65	6,100	55	73,700	54
Veneer logs	400	1	1,400	4	200	2	7,800	6
Pulpwood	100	**	—	—	—	—	900	1
Posts, poles, pilings	200	1	1,200	4	—	—	5,300	4
One other product	1,600	6	1,000	3	*	**	4,500	3
Sawlogs and veneer	1,800	7	1,400	4	100	1	4,600	4
Sawlogs and pulpwood	300	1	—	—	800	7	3,100	2
Sawlogs & posts, poles, pilings	900	3	1,800	5	3,000	27	8,400	6
Other two product combination	600	2	200	1	200	2	2,000	1
Three product combination	5,200	20	200	1	100	1	6,000	5
Four or more products	—	—	*	**	100	1	200	**
Don't know	100	**	3,800	11	*	**	4,500	3
No answer	1,800	7	500	2	400	4	14,900	11
Total	26,800	100	33,000	100	11,000	100	135,900	100
				ACRES OWNED				
Sawlogs	762,200	63	573,000	53	207,300	57	3,174,100	53
Veneer logs	34,800	3	50,800	5	11,500	3	222,900	4
Pulpwood	8,100	1	—	—	—	—	64,500	1
Posts, poles, pilings	52,200	4	30,500	3	—	—	138,000	2
One other product	49,600	4	17,100	2	5,800	2	164,400	3
Sawlogs and veneer	52,100	4	27,400	3	5,800	2	228,400	4
Sawlogs and pulpwood	32,200	3	—	—	11,500	3	190,200	3
Sawlogs & posts, poles, pilings	44,200	4	47,600	4	23,000	6	241,100	4
Other two product combination	25,500	2	99,000	9	11,500	3	256,100	4
Three product combination	60,300	5	35,100	3	17,300	5	246,400	4
Four or more products	—	—	28,800	3	35,700	10	239,500	4
Don't know	18,700	1	70,200	6	11,500	3	153,900	3
No answer	69,400	6	102,200	9	23,100	6	651,100	11
Total	1,209,300	100	1,081,700	100	364,000	100	5,970,600	100

*Fewer than 50 owners.
**Less than 0.5 percent.

Table 43.—Agency that owners would contact for forestry assistance, by number of owners, acres of commercial forest land owned, and geographic units, Kentucky, 1975

Agency	Eastern		Northern Cumberland		Southern Cumberland		Bluegrass	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
State forestry	10,600	18	10,400	19	13,800	21	15,000	20
Soil Conservation Service	100	**	300	1	300	**	900	1
Forest Service	300	1	200	**	4,000	6	*	**
Agricultural Stabilization and Conservation Service	—	—	1,500	3	2,500	4	1,000	1
Consultant or industry forester	*	**	*	**	*	**	—	—
Extension Service	*	**	300	1	100	**	*	**
Other	—	—	200	**	*	**	—	—
Don't know	38,100	63	13,400	25	29,000	43	18,700	25
No answer	11,100	18	27,900	51	17,300	26	38,700	53
Total	60,200	100	54,200	100	67,000	100	74,300	100
				ACRES OWNED				
State forestry	391,500	22	497,800	28	492,900	29	254,900	19
Soil Conservation Service	38,900	2	17,000	1	25,900	2	30,300	2
Forest Service	30,000	2	19,500	1	112,300	6	40,700	3
Agricultural Stabilization and Conservation Service	—	—	36,800	2	69,100	4	51,100	4
Consultant or industry forester	169,600	9	74,100	4	8,600	**	—	—
Extension Service	29,400	2	10,900	1	17,300	1	9,500	1
Other	—	—	11,000	1	8,600	**	—	—
Don't know	683,400	38	604,800	35	630,400	36	481,400	37
No answer	457,800	25	472,200	27	372,500	22	440,900	34
Total	1,800,600	100	1,744,100	100	1,737,600	100	1,308,800	100

Agency	Pennyroyal		Western Coalfield		Western		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
State forestry	20,700	24	6,100	7	4,000	16	80,600	18
Soil Conservation Service	4,800	5	800	1	—	—	7,200	2
Forest Service	2,000	2	*	**	*	**	6,500	1
Agricultural Stabilization and Conservation Service	800	1	2,000	2	700	3	8,500	2
Consultant or industry forester	—	—	*	**	200	1	200	**
Extension Service	100	**	1,900	2	—	—	2,400	1
Other	1,600	2	—	—	400	2	2,200	**
Don't know	40,400	46	49,300	56	13,100	54	202,000	44
No answer	17,700	20	27,400	32	5,900	24	146,000	32
Total	88,100	100	87,500	100	24,300	100	455,600	100
				ACRES OWNED				
State forestry	594,500	29	418,800	23	161,300	28	2,811,700	26
Soil Conservation Service	41,600	2	55,400	3	—	—	209,100	2
Forest Service	61,500	3	11,700	1	5,800	1	281,500	3
Agricultural Stabilization and Conservatio n Service	53,400	3	40,500	2	34,500	6	285,400	3
Consultant or industry forester	—	—	43,700	2	35,800	6	331,800	3
Extension Service	9,300	**	42,200	2	—	—	118,600	1
Other	17,400	1	—	—	11,500	2	48,500	**
Don't know	820,900	41	781,900	44	230,400	41	4,233,200	38
No answer	426,600	21	424,800	23	92,000	16	2,686,800	24
Total	2,025,200	100	1,819,000	100	571,300	100	11,006,600	100

*Fewer than 50 owners.
**Less than 0.5 percent.

Table 44.—Forestry services received, by nature of service, number of owners, acres of commercial forest land owned, and geographic units, Kentucky, 1975

Service received	Eastern		Northern Cumberland		Southern Cumberland		Bluegrass	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
Timber marking	*	**	—	—	700	1	300	**
Timber stand improvement	500	1	100	**	800	1	*	**
Planting	100	**	400	1	1,000	1	1,200	2
Timber sales administration	*	**	*	**	700	1	—	—
Insect and disease control	600	1	—	—	—	—	100	**
Timber evaluation	200	**	200	**	500	1	400	1
Surveying	—	—	—	—	400	1	—	—
Management	*	**	1,000	2	400	1	1,400	2
Other	100	**	*	**	200	**	500	1
No answer	58,700	98	52,500	97	64,300	96	70,600	95
Total[a]	60,200	100	54,200	100	67,000	100	74,300	100
				ACRES OWNED				
Timber marking	30,000	2	—	—	69,100	4	19,900	2
Timber stand improvement	15,300	1	11,000	1	60,500	3	10,400	1
Planting	15,300	1	38,900	2	43,200	2	52,200	4
Timber sales administration	43,300	2	11,000	1	17,300	1	—	—
Insect and disease control	24,200	1	—	—	—	—	7,400	1
Timber evaluation	44,700	2	56,300	3	51,800	3	39,900	3
Surveying	—	—	—	—	17,300	1	—	—
Management	193,200	11	174,100	10	113,000	7	58,500	4
Other	15,300	1	10,900	1	17,300	1	10,400	1
No answer	1,433,700	80	1,463,900	84	1,460,500	84	1,129,300	86
Total[a]	1,800,600	100	1,744,100	100	1,737,600	100	1,308,800	100

Service received	Pennyroyal		Western Coalfield		Western		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
Timber marking	500	1	400	1	1,400	6	3,300	1
Timber stand improvement	300	**	200	**	*	**	1,900	**
Planting	5,100	6	300	**	—	—	8,100	2
Timber sales administration	100	**	*	**	—	—	800	**
Insect and disease control	—	—	100	**	—	—	800	**
Timber evaluation	400	**	1,400	2	800	3	3,900	1
Surveying	—	—	100	**	—	—	500	**
Management	2,700	3	300	**	200	1	6,000	1
Other	—	—	—	—	*	**	800	**
No answer	79,600	90	84,800	97	22,000	91	432,500	95
Total[a]	88,100	100	87,500	100	24,300	100	455,600	100
				ACRES OWNED				
Timber marking	26,700	1	64,300	4	46,100	8	256,100	2
Timber stand improvement	61,500	3	8,500	**	11,500	2	178,700	2
Planting	84,400	4	28,800	2	—	—	262,800	2
Timber sales administration	18,600	1	35,100	2	—	—	125,300	1
Insect and disease control	—	—	11,700	1	—	—	43,300	**
Timber evaluation	76,400	4	87,300	5	51,800	9	408,200	4
Surveying	—	—	10,300	1	—	—	27,600	**
Management	102,700	5	67,900	4	40,300	7	749,700	7
Other	—	—	—	—	5,800	1	59,700	1
No answer	1,729,900	85	1,537,400	85	456,100	80	9,210,800	84
Total[a]	2,025,200	100	1,819,000	100	571,300	100	11,006,600	100

[a] 23,100 owner—5 percent—owning 1,795,800 acres—16 percent of the acreage—received some form of forestry assistance. Columns do not add to totals because some owners received more than one service.

*Fewer than 50 owners.

**Less than 0.5 percent.

Table 45.—Estimated number of owners who permit and do not permit public use of their land, by acres of commercial forest land owned, and by geographic unit, Kentucky, 1975

Public use	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
		EASTERN		
Permitted	31,800	53	1,085,500	60
Not permitted	15,400	25	281,800	16
No answer	13,000	22	433,300	24
Total	60,200	100	1,800,600	100
		NORTHERN CUMBERLAND		
Permitted	18,000	33	938,600	54
Not permitted	10,200	19	386,600	22
No answer	26,000	48	418,900	24
Total	54,200	100	1,744,100	100
		SOUTHERN CUMBERLAND		
Permitted	30,000	45	1,064,000	61
Not permitted	19,700	29	414,500	24
No answer	17,300	26	259,100	15
Total	67,000	100	1,737,600	100
		BLUEGRASS		
Permitted	12,600	17	412,400	32
Not permitted	42,900	58	706,200	54
No answer	18,800	25	190,200	14
Total	74,300	100	1,308,800	100
		PENNYROYAL		
Permitted	34,300	39	1,000,700	50
Not permitted	40,300	46	815,900	40
No answer	13,500	15	208,600	10
Total	88,100	100	2,025,200	100
		WESTERN COALFIELD		
Permitted	40,500	46	894,200	49
Not permitted	37,500	43	707,500	39
No answer	9,500	11	217,300	12
Total	87,500	100	1,819,000	100
		WESTERN		
Permitted	11,000	45	329,400	58
Not permitted	7,300	30	184,300	32
No answer	6,000	25	57,600	10
Total	24,300	100	571,300	100
		TOTAL		
Permitted	178,200	39	5,724,800	52
Not permitted	173,300	38	3,496,800	32
No answer	104,100	23	1,785,000	16
Total	455,600	100	11,006,600	100

able 46.—Estimated number of owners who permit use, by uses permitted, acres of commercial forest land owned, and geographic units, Kentucky, 1975

Use	Eastern		Northern Cumberland		Southern Cumberland		Bluegrass	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
Hiking	5,700	9	4,300	8	11,200	17	1,400	2
Picnicking	6,100	10	3,700	7	7,900	12	1,600	2
Camping	4,500	7	4,100	8	7,300	11	600	1
Fishing	1,800	3	3,300	6	6,300	9	6,500	9
Hunting	29,900	50	15,000	28	28,200	42	7,000	9
Snowmobiling	800	1	1,100	2	3,200	5	—	—
Other	100	**	200	**	1,600	2	300	**
Total[a]	31,800	53	18,000	33	30,000	45	12,600	17
				ACRES OWNED				
Hiking	586,300	33	320,200	18	467,000	27	126,900	10
Picnicking	488,700	27	239,600	14	372,100	21	138,200	11
Camping	434,500	24	259,200	15	328,900	19	70,200	5
Fishing	247,500	14	168,400	10	233,900	13	149,800	11
Hunting	993,600	55	886,200	51	951,700	55	331,100	25
Snowmobiling	70,500	4	77,100	4	52,600	3	—	—
Other	66,300	4	28,200	2	43,200	2	20,800	2
Total[a]	1,085,500	60	938,600	54	1,064,000	61	412,400	32

Use	Pennyroyal		Western Coalfield		Western		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
Hiking	11,600	13	13,400	15	7,500	31	55,100	12
Picnicking	8,800	10	2,100	2	5,400	22	35,600	8
Camping	6,500	7	1,500	2	2,300	9	26,800	6
Fishing	5,300	6	3,700	4	2,500	10	29,400	6
Hunting	30,500	35	37,300	43	6,600	27	154,500	34
Snowmobiling	500	1	100	**	—	—	5,700	1
Other	2,600	3	200	**	300	1	5,300	1
Total[a]	34,300	39	40,500	46	11,000	45	178,200	39
				ACRES OWNED				
Hiking	448,700	22	260,500	14	168,200	29	2,377,800	22
Picnicking	366,100	18	171,400	9	139,400	24	1,915,500	17
Camping	339,300	17	226,800	12	116,300	20	1,775,200	16
Fishing	265,500	13	281,700	15	99,100	17	1,445,900	13
Hunting	852,300	42	781,300	43	277,600	49	5,073,800	46
Snowmobiling	45,000	2	31,900	2	—	—	277,100	3
Other	34,700	2	28,800	2	11,500	2	233,500	2
Total[a]	1,000,700	50	894,200	49	329,400	58	5,724,800	52

*Less than 0.5 percent.

Columns do not add to totals because some owners permit more than one use by the public.

Table 47.—Estimated number of private owners of commercial forest land and acres owned, by reason for posting the land and geographic unit, Kentucky, 1975

Reason	Eastern		Northern Cumberland		Southern Cumberland		Bluegrass	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
Abuse	—	—	*	**	500	1	2,200	3
Safety	400	1	200	**	200	**	100	**
Liability	*	**	*	**	—	—	—	—
Access	*	**	700	1	100	**	3,700	5
Hunting	5,100	8	600	1	600	1	2,100	3
Reason not specified	*	**	300	1	1,500	2	6,400	9
Total posted	5,500	9	1,800	3	2,900	4	14,500	20
Land not posted	43,000	72	28,600	53	55,000	82	42,100	56
No answer	11,700	19	23,800	44	9,100	14	17,700	24
Total	60,200	100	54,200	100	67,000	100	74,300	100
				ACRES OWNED				
Abuse	—	—	10,900	1	51,800	3	99,200	7
Safety	14,700	1	19,600	1	25,900	2	7,400	1
Liability	24,200	1	28,200	1	—	—	—	—
Access	44,700	2	43,700	2	43,200	2	63,700	5
Hunting	15,400	1	47,500	3	34,500	2	100,800	8
Reason not specified	27,000	2	47,700	3	86,400	5	39,600	3
Total posted	126,000	7	197,600	11	241,800	14	310,700	24
Land not posted	1,310,900	73	1,255,800	72	1,366,200	79	855,200	65
No answer	363,700	20	290,700	17	129,600	7	142,900	11
Total	1,800,600	100	1,744,100	100	1,737,600	100	1,308,800	100

Reason	Pennyroyal		Western Coalfield		Western		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
Abuse	4,100	5	1,300	1	3,200	13	11,300	2
Safety	4,500	5	2,000	2	100	**	7,500	2
Liability	—	—	700	1	100	**	800	**
Access	300	**	14,400	17	200	1	19,400	4
Hunting	1,300	2	2,700	3	2,500	11	14,900	3
Reason not specified	2,000	2	2,900	3	300	1	13,400	3
Total posted	12,200	14	24,000	27	6,400	26	67,300	14
Land not posted	69,700	79	63,000	72	16,000	66	317,400	70
No answer	6,200	7	500	1	1,900	8	70,900	16
Total	88,100	100	87,500	100	24,300	100	455,600	100
				ACRES OWNED				
Abuse	95,000	5	71,100	4	17,300	3	345,300	3
Safety	25,400	1	106,100	6	17,300	3	216,400	2
Liability	9,300	**	105,400	6	5,700	1	172,800	2
Access	42,900	2	130,900	7	28,800	5	397,900	4
Hunting	118,000	6	130,000	7	51,800	9	498,000	4
Reason not specified	113,600	6	107,500	6	34,600	6	456,400	4
Total posted	404,200	20	651,000	36	155,500	27	2,086,800	19
Land not posted	1,498,000	74	1,039,300	57	387 000	68	7,712,400	70
No answer	123,000	6	128,700	7	28,800	5	1,207,400	11
Total	2,025,200	100	1,819,000	100	571,300	100	11,006,600	100

*Fewer than 50 owners.
**Less than 0.5 percent.

Table 48.—Estimated number of individual owners of commercial forest land and acres owned, by conservation-related organization membership, Kentucky, 1975

Organization	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
American Forestry Association	100	**	33,100	**
Izaak Walton League	100	**	8,600	**
Audubon Society	900	**	67,100	1
National Wildlife Federation	3,900	1	240,800	3
A Sportsman's Club	11,600	3	415,100	5
National Farmers Organizations	6,700	2	289,400	3
American Tree Farm	1,300	**	147,500	2
The Sierra Club	1,300	**	38,600	**
Other	9,000	2	644,500	7
No membership	331,900	78	6,561,600	71
No answer	67,400	16	1,254,500	14
Total[a]	427,200	100	9,200,000	100

[a] Columns do not add to totals because some owners belong to more than one organization.

** Less than 0.5 percent.

Table 49.—Estimated number of individual owners of commercial forest land and acres owned, by conservation-oriented publications they receive, Kentucky, 1975

Publication	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
Tree Farm News	1,100	**	120,500	1
American Forests	300	**	42,500	**
National Wildlife	4,000	1	284,500	3
Audubon Magazine	2,100	**	114,300	1
National Parks and Recreation	900	**	26,100	**
Field and Stream	24,000	6	837,000	10
Sports Afield	16,000	4	698,200	8
Kentucky Farmer	75,900	18	2,471,600	27
Ranger Rick	1,900	**	102,900	1
Progressive Farmer	21,300	5	564,600	6
Other	31,300	7	592,800	6
No subscription	229,500	54	4,545,500	49
No answer	61,300	14	1,039,500	11
Total[a]	427,200	100	9,200,000	100

[a] Columns do not add to totals because owners subscribe to more than one publication.

** Less than 0.5 percent.

Table 50.—Responses to true-false statements by individual owners of commercial forest land and acres owned, Kentucky, 1975

Statement and answer	Correct	Response				Total
		True	False	Don't know	No answer	
	Percent	*Number*	*Number*	*Number*	*Number*	*Number*
			OWNERS			
1-True	63	270,200	8,800	46,700	101,500	427,200
2-False	33	125,400	140,500	53,300	108,000	427,200
3-True	35	151,500	17,000	143,700	115,000	427,200
4-False	20	146,000	87,700	66,000	127,500	427,200
5-False	41	47,000	174,100	94,700	111,400	427,200
6-False	9	195,400	38,100	82,400	111,300	427,200
7-False	18	98,300	75,800	140,000	113,100	427,200
8-True	10	40,900	18,700	246,400	121,200	427,200
9-False	25	118,900	107,900	84,400	116,000	427,200
10-True	36	155,500	8,500	147,000	116,200	427,200
			ACRES OWNED			
1-True	74	6,796,600	82,600	926,100	1,394,700	9,200,000
2-False	53	1,805,700	4,910,700	1,012,900	1,470,700	9,200,000
3-True	45	4,116,100	354,300	2,926,500	1,803,100	9,200,000
4-False	23	3,713,700	2,139,000	1,637,100	1,710,200	9,200,000
5-False	59	560,100	5,389,300	1,661,300	1,589,300	9,200,000
6-False	7	5,687,300	617,600	1,200,800	1,694,300	9,200,000
7-False	18	2,861,400	1,653,300	2,967,400	1,717,900	9,200,000
8-True	12	1,128,100	558,300	5,475,400	2,038,200	9,200,000
9-False	33	2,992,500	3,002,000	1,537,900	1,667,600	9,200,000
10-True	53	4,861,000	401,500	2,311,400	1,626,100	9,200,000

Table 51.—Estimated number of individual owners of commercial forest land and acres owned, by percent score on 10 true-false statements, Kentucky, 1975

Correct (percent)	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
0	7,800	2	117,200	1
10	46,900	11	407,300	4
20	27,200	6	653,100	7
30	44,900	11	895,600	10
40	38,800	9	1,336,500	15
50	31,900	7	1,310,400	14
60	39,400	9	1,394,900	15
70	23,500	6	755,700	8
80	32,900	8	359,800	4
90	2,800	1	148,300	2
100	300	**	44,300	**
10 don't know	19,000	4	366,700	4
10 no answers	100,200	23	1,341,900	15
10 mixed	11,600	3	68,300	1
Total	427,200	100	9,200,000	100

** Less than 0.5 percent.

Birch, Thomas W., and Douglas S. Powell.
1978. **The forest-land owners of Kentucky.** Northeast. For. Exp. Stn., Broomall, Pa.
101 p., illus. (U.S. Dep. Agric. For. Serv. Resour. Bull. NE-57)

A statistical-analytical report of a mail canvass of the owners of privately owned commercial forest land in Kentucky. The study was conducted in conjunction with the third forest survey of Kentucky by the Forest Service, U.S. Department of Agriculture. Statistical findings are based on responses supplied by owners to a mail questionnaire. Trends in forest-land ownership and the attitudes and intentions of owners regarding reasons for owning forest land, timber management, timber harvesting, recreational use, etc., are discussed.

Keywords: Forest-land owners, available timber, harvesting timber, forestry assistance, recreation

923.9(769)

Birch, Thomas W., and Douglas S. Powell.
1978. **The forest-land owners of Kentucky.** Northeast. For. Exp. Stn., Broomall, Pa.
101 p., illus. (U.S. Dep. Agric. For. Serv. Resour. Bull. NE-57)

A statistical-analytical report of a mail canvass of the owners of privately owned commercial forest land in Kentucky. The study was conducted in conjunction with the third forest survey of Kentucky by the Forest Service, U.S. Department of Agriculture. Statistical findings are based on responses supplied by owners to a mail questionnaire. Trends in forest-land ownership and the attitudes and intentions of owners regarding reasons for owning forest land, timber management, timber harvesting, recreational use, etc., are discussed.

Keywords: Forest-land owners, available timber, harvesting timber, forestry assistance, recreation

923.9(769)

Headquarters of the Northeastern Forest Experiment Station are in Broomall, Pa. Field laboratories and research units are maintained at:

- Beltsville, Maryland.
- Berea, Kentucky, in cooperation with Berea College.
- Burlington, Vermont, in cooperation with the University of Vermont.
- Delaware, Ohio.
- Durham, New Hampshire, in cooperation with the University of New Hampshire.
- Hamden, Connecticut, in cooperation with Yale University.
- Kingston, Pennsylvania.
- Morgantown, West Virginia, in cooperation with West Virginia University, Morgantown.
- Orono, Maine, in cooperation with the University of Maine, Orono.
- Parsons, West Virginia.
- Princeton, West Virginia.
- Syracuse, New York, in cooperation with the State University of New York College of Environmental Sciences and Forestry at Syracuse University, Syracuse.
- University Park, Pennsylvania.
- Warren, Pennsylvania.

THE FOREST-LAND OWNERS OF WEST VIRGINIA

CLEMSON UNIVERSITY LIBRARY
JAN 9 1979
SCI., TECH. & AGR. DIV.

by Thomas W. Birch
and Neal P. Kingsley

FOREST SERVICE RESOURCE BULLETIN NE-58
1978
FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE
NORTHEASTERN FOREST EXPERIMENT STATION
370 REED ROAD, BROOMALL, PA. 19008

COVER PHOTO: An aerial view of Kanawha County, West Virginia

The Authors

THOMAS W. BIRCH, research forester, received a B. S. degree from Michigan State University in 1969, and a M. S. degree from Michigan State in March 1974. He joined the Northeastern Forest Experiment Station in 1974, and now is a resource analyst in the Station's Resources Evaluation unit, located in Broomall, Pa.

NEAL P. KINGSLEY, research forester, received a B. S. degree in forestry from the University of New Hampshire in 1961, and a M. S. degree in forest economics from the same university in 1963. He joined the Northeastern Forest Experiment Station in August 1962, and is now resource analysis group leader in the Station's Resources Evaluation Work unit.

MANUSCRIPT RECEIVED FOR PUBLICATION 17 JANUARY 1978

Abstract

There are an estimated 207,500 owners of private commercial forest land in West Virginia. They own an average of 49.8 acres each. However, fewer than 500 owners own 30 percent of the private commercial forest land. Corporations hold 25 percent of the privately owned commercial forest land in the State. Seventy-seven percent of the owners intend to harvest timber from their land. Some form of forestry assistance has been received by 11 percent of the owners. These owners hold 36 percent of the private commercial forest land in West Virginia. Sixty percent of all private forest-land owners allow some form of public recreation in their woodlands.

Contents

HIGHLIGHTS
THE FOREST LAND AND ITS OWNERS 1
207,500 owners 2
88 percent are individuals 2
The individual forest-land owner 2
Corporate and other owners 4
OWNER OBJECTIVES 4
Why people own forest land 4
HOW MUCH TIMBER IS AVAILABLE? 6
Maximum estimate 6
Minimum estimate 6
Interpreting the estimates 7
TIMBER HARVESTING PRACTICES 7
Why owners harvest timber 7
Why some owners do not harvest timber 9
Predicting owner behavior 9
SOME ASPECTS OF FOREST MANAGEMENT ON PRIVATE OWNERSHIPS 12
Harvesting practices 12
Products harvested 12
Forestry assistance 12
Recreation on private forest land 13
LANDOWNER INTERESTS 13
CONSERVATION QUIZ 15
CONCLUSION 16
LITERATURE CITED 16
APPENDIX 17
Study method 17
Sampling errors 18
Definition of terms 18
Metric equivalents 19
Questionnaire 20
INDEX TO TABLES 32

HIGHLIGHTS

★ There are an estimated 207,500 owners of private commercial forest land in West Virginia. They own an average of 49.8 acres each.

★ Fewer than 500 owners own 30 percent of the private commercial forest land.

★ Corporations own 25 percent of the privately owned commercial forest land.

★ Owners who intend to harvest timber own 77 percent of the private commercial forest land in the State.

★ Some form of forestry assistance has been received by 11 percent of the private forest-land owners. They own 36 percent of the private commercial forest land in West Virginia.

★ Sixty percent of all forest-land owners in West Virginia allow some form of public use of their woodlands for recreation.

THE FOREST LAND AND ITS OWNERS

THE RECENTLY COMPLETED forest survey of West Virginia provided estimates of forest area and timber volume by broad owner categories (Bones 1978). It did not provide estimates of the volume or acreage of timber that might be available for harvesting. Nor did it describe the attitudes of typical forest-land owners, their reasons for owning forest land, or their views toward timber harvesting, forest management, and recreational use of the land by the public. The purpose of this report is to provide this information in a form that will be useful when used with the forest resource report for the State.

Public agencies need this information to plan and organize forestry and related programs geared to forest-land owners. Forest industries wishing to locate available supplies of raw materials will also find this information useful. Researchers studying the motivations and objectives of forest-land owners will have a data base from which to start their work. A knowledge of the forest resources of West Virginia requires an understanding of forest-land owners, because 90 percent of the commercial forest land is privately owned.

The data presented here are based on a sample of forest-land owners. The results of this sample have been statistically expanded to estimate the total population of owners of privately held forest land and the acreage they own. To fully understand how estimates were made, the user of these data is advised to read the discussion of study methods and sampling errors in the Appendix.

For the resurvey of the forest resources of West Virginia, data were developed for four geographic sampling units: (1) National Forest Land; (2) the Northeastern Unit; (3) the Southern Unit, and (4) the Northwestern Unit. Because the entire National Forest Unit is in public ownership, it was excluded from this report (Fig.1).

Figure 1.—Geographic sampling units for West Virginia.

207,500 OWNERS

There are an estimated 207,500 owners of private commercial forest land in West Virginia. Ownerships range from 1 acre to more than 250,000 acres. The average ownership is 49.8 acres, but 40 percent of the owners own fewer than 10 acres. Fewer than 500 owners—0.2 percent—own 30 percent of the commercial forest land (Fig. 2). The greatest concentration of large holdings is in the Southern Unit, where 51 percent of the commercial forest land is held by owners of more than 1,000 acres. Most of these are in corporate ownership. Corporations own 47 percent of the private commercial forest land in the Southern Unit.

88 PERCENT ARE INDIVIDUALS

Individuals account for an estimated 88 percent of all private ownerships. Collectively they own 63 percent of the land. Corporations account for only 1 percent of the owners, but own 25 percent of the State's privately owned commercial forest land (Fig. 3).

THE INDIVIDUAL FOREST-LAND OWNER

As the energy crisis continues many West Virginia coal communities are thriving. Other communities have been able to diversify their industries and are also moving forward economically. Skilled workers, business owners and execu-

Figure 2.—Distribution of private ownerships by size class of ownership, and percentage of owners and acreage.

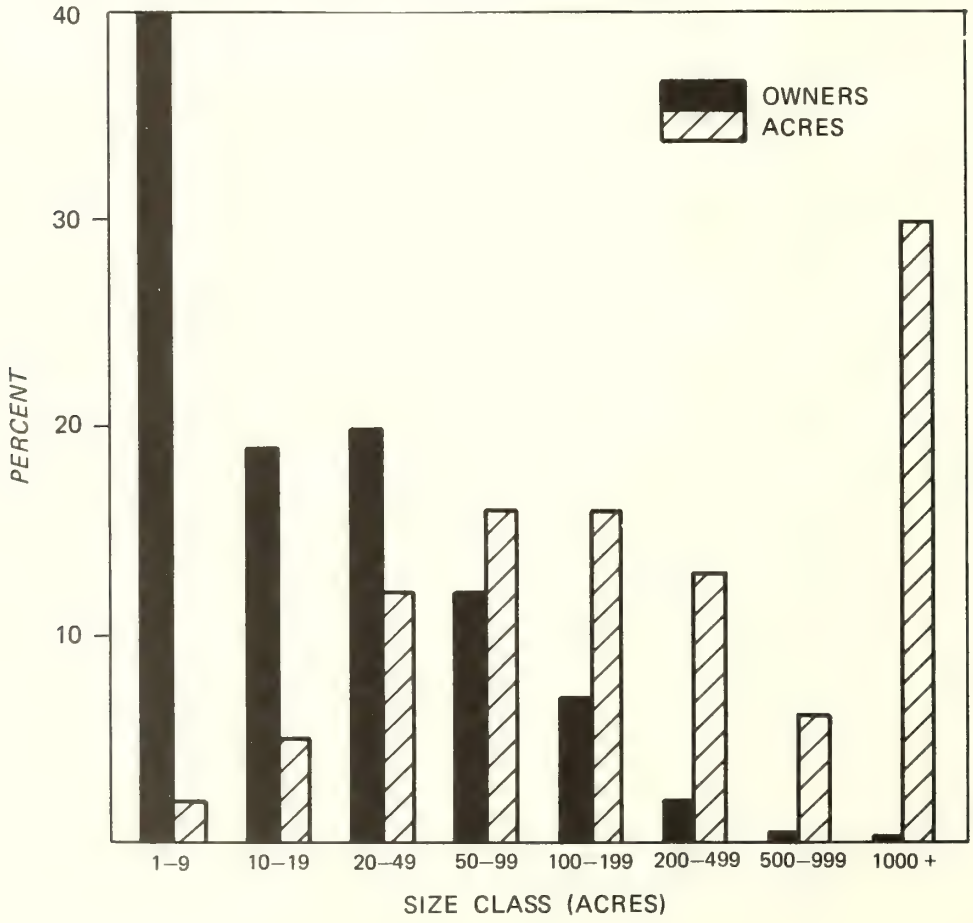
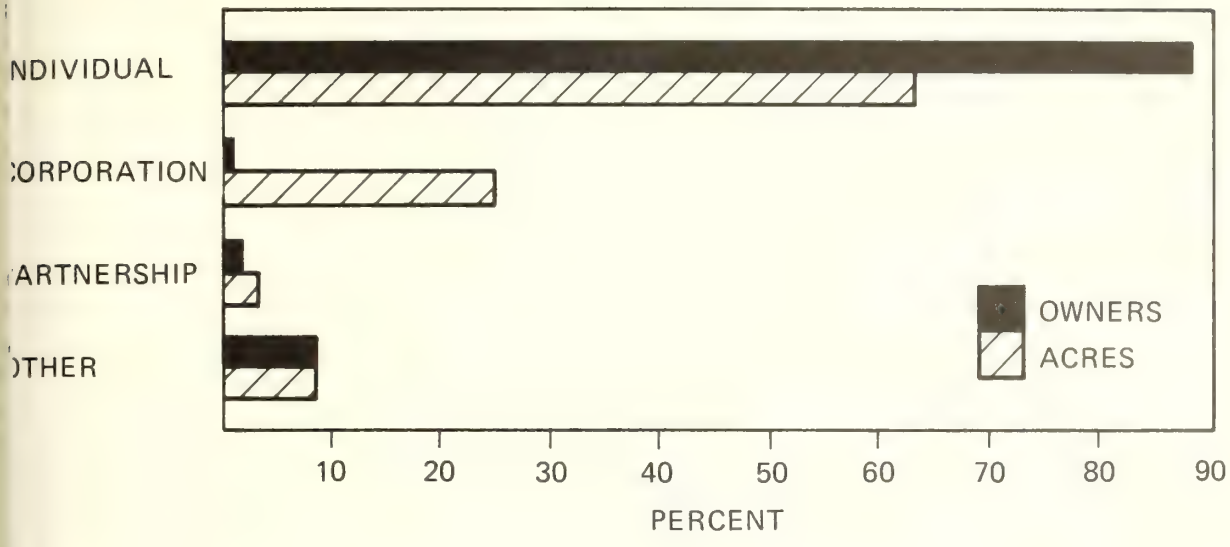


Figure 3.—Percentage of owners and acreage owned, by form of ownership.



tives, white collar workers, and various professionals have invested in forest land for a number of reasons. These groups account for 13 percent of the individual owners. They control 26 percent of the forest land owned by individuals.

As the mechanization of farm production has increased across the country, the farmers of West Virginia have found it difficult to compete with flatland farmers. Many of West Virginia's farmers have concentrated on valley bottoms and have allowed the steep slopes to revert to trees. Many other farms have been abandoned and are also reverting to trees. We estimate that 16 percent of the individual forest-land owners would list their primary occupation as farmer. These owners control 22 percent of the forest land owned by individuals.

The economic importance of agriculture differs among regions of the State. Our data show that 27 percent of the individuals in the Northeastern Unit are farmers, and that they hold 28 percent of the individually owned forest land. In the Southern Unit, we estimate that only 5 percent of the individual owners are farmers. They control 14 percent of the individually owned forest land. It must be pointed out that these estimates are based on what the respondents to our questionnaire listed as their primary occupation. The classification "farmer" does not include owners who are part-time or retired farmers. By contrast, the Census of Agriculture includes some of these groups in its definition of farmer (U. S. Bureau of the Census 1969).

We estimate that more than 50 percent of the individual owners are retired or are employed in some form of unskilled labor. These owners control 37 percent of the commercial forest land owned by individuals. Forty-three percent of the individual owners have 8 years or less of formal education—only 18 percent of the individual owners were educated beyond high school. Fifty-six percent of the individual owners have a gross income of less than $10,000 per year. These owners hold 51 percent of the forest land owned by individuals.

A look at the ages of today's owners and their length of tenure indicates what may happen to lands owned by individuals. Sixty-eight percent of the individual owners are over 45 years of age—23 percent are over 65 years old. Those over 45 years old hold 75 percent of the individually owned forest land—those over 65 own 30 percent. By virtue of owner age alone, we expect that much of the land owned by people over 65 will pass to new owners in the next 10 years.

Thirty percent of the individual owners have owned forest land for fewer than 10 years. These owners control 30 percent of the forest land owned by individuals. So past performance would also indicate a considerable change of ownership among these individuals in the next 10 years.

Through active purchase programs, forest industries and coal companies will continue to consolidate their holdings in the southern part of the State.

Large numbers of forest-land owners have had a close association with the land for a long period of time. Nineteen percent of the individual owners have owned their land for more than 25 years. These owners control 33 percent of the commercial forest land owned by individuals. For 61 percent of all owners, the nearest tract of their forest land is adjacent to or within 1 mile of their residence. Most of these owners only own one tract but 57 percent of all owners also reside within 1 mile of their farthest tract. Seventy-three percent of the individual owners spent the first 12 years of their life in a rural area or on a farm. These facts present a more stable picture of forest-land ownership in West Virginia than has been found in most other northeastern states. Because forest management is often a long-term venture—particularly for timber products—this stability of ownership should be encouraging to forest managers.

The following profiles of the typical forest-land owner in the three geographic units are strikingly similar:

Category	*Northeastern*	*Southern*	*Northwestern*
Age	45–64	45–64	45–64
Education	0–12 years	0–12 years	0–12
Income	Under $10,000	Under $10,000	$10,000–$15,000
Early life environment	Rural area or farm	Rural area or farm	Rural area or farm
Occupation	Laborer	Retired	Laborer
Length of ownership	More than 10 years	More than 10 years	More than 10 years
Size of tract	Less than 20 acres	Less than 20 acres	Less than 20 acres
Distance to nearest tract	Less than 1 mile	Less than 1 mile	Less than 1 mile
Number of tracts	one	one	one
Reason for owning	Part of residence	Part of farm or esthetic enjoyment	Farm and domestic use

CORPORATE AND OTHER OWNERS

Corporations control an estimated 25 percent of the privately owned commercial forest land in West Virginia. Partnerships, undivided estates, clubs, associations, and trusts account for an additional 12 percent of the forest land. Corporate forest-industry lands total 816,500 acres and are held by fewer than 50 owners. Nonforest industries hold 963,900 acres. The majority of corporate owners are in this class. Many own the land for what is below the surface: coal, oil, natural gas, and other raw materials. Corporations that have harvested timber hold 93 percent of the land owned by corporations.

OWNER OBJECTIVES

WHY PEOPLE OWN FOREST LAND

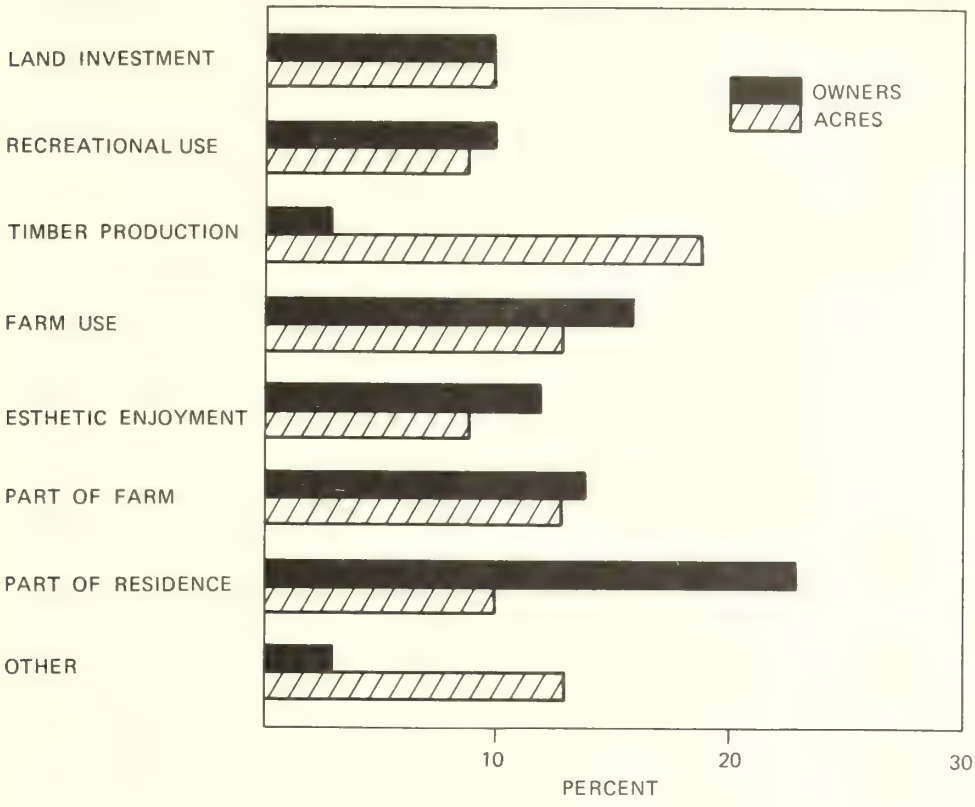
Because land values seldom decrease, many land owners expect to benefit from this increase in value. We estimate that only 10 percent of the forest-land owners in West Virginia consider land investment as the primary reason for owning commercial forest land (Fig. 4). Twenty-two percent, however, feel that the increase in value was the most important benefit received from their forest land in the last 5 years. Twenty-four percent expect the increase in land value to be the most important benefit in the next 5 years.

Marler and Graves (1974) felt that all land owners speculate in land to some extent. They felt that owners holding land only for speculation see ownership as a no-input investment and therefore do not manage the land. Our data show that while some owners may purchase forest land for investment, twice as many owners have found that the increase in land value was an important benefit in the last 5 years.

Ten percent of the owners in West Virginia purchased their land for recreational use. Twelve percent of the owners felt that recreation was the most important benefit in the last 5 years. Eleven percent expect recreation to be an important benefit in the next 5 years.

Owning land for timber production or for farm or domestic use requires the cutting of trees, the

Figure 4.—Primary reason for owning forest land, by percentage of owners and acreage.



only major difference between these objectives being the sale or retention of the end product. Only 3 percent of the owners considered timber production as the primary reason for owning forest land. These owners own an estimated 19 percent of the private commercial forest land in West Virginia. The greatest concentration of land owned primarily for timber production is in the Southern Unit, where 32 percent of the forest land is owned for this purpose. Most of this land is in large corporate holdings. Sixteen percent of the owners own forest land for farm or domestic use—they own 13 percent of the private commercial forest land in the State. These owners harvest trees as needed to build a new house or barn, to replenish a supply of fence posts, or to use as fuel.

Income from the sale of timber was the primary benefit from the woodlands for 3 percent of the owners in the last 5 years. These owners own 18 percent of the commercial forest land. In addition, an estimated 19 percent of the owners considered farm or domestic use as the primary benefit from their land in the last 5 years; this group holds 16 percent of the commercial forest land.

In estimating the numbers of owners who expect timber production or farm or domestic use to be important benefits in the next 5 years, we found only slight differences between the number of owners and acreage owned and the benefits received in the last 5 years. The only differences arise from the owners who harvested timber in the last 5 years but who do not expect to harvest in the next 5 years. These owners and the acres they own are offset by owners who have not harvested but who expect to harvest in the next 5 years.

The satisfaction from just having "green space" is an important reason for owning woodland in West Virginia. We estimate that 12 percent of the owners consider esthetic enjoyment as a primary reason for owning forest land. Fourteen percent of the owners own woodland as part of the farm, but this woodland serves no useful function in the farm operation. Twenty-three percent of the owners own forest land as part of their residence

(the reason for owning forest land given most frequently). These three groups of owners own 32 percent of the private commercial forest land. Many of these owners expect increases in land value to be important in the next 5 years, but most still feel that esthetic enjoyment will be the most important benefit in the next 5 years. If timber production from privately owned lands is to be increased, this group of owners will have to be shown that harvesting trees will not impair their enjoyment of the land.

Another reason for owning forest land in West Virginia is the mineral wealth that lies below the surface. An estimated 3 percent of the owners gave "other" as the primary reason for owning forest land. Most of the respondents that checked "other" specified minerals, gas, oil, or coal. Most of these mineral lands are in the Southern Unit, where they represent 20 percent of the private forest area.

HOW MUCH TIMBER IS AVAILABLE?

A major objective of this study is to estimate the volume of timber that might be available for harvesting. The answer or answers to this question will be influenced by how the estimator defines availability, and the assumptions used in developing the estimate. The usefulness of any estimate is limited to the time in which it is made, because industrial, market, and social conditions continually change; thus, the amount of available timber must be redetermined periodically.

An owner's willingness to harvest timber does not ensure that even a single tree will be cut during his period of ownership. Similarly, the owner who today says he would never harvest might sell all of his timber tomorrow. We say so many acres of forest land are available for timber production with the understanding that the land is constantly changing hands.

We made two estimates of how much timber is available in the State on the basis of different sets of assumptions. This procedure allows the reader to select the estimate that best fits his needs.

MAXIMUM ESTIMATE

Seventy-seven percent of the private forest land in West Virginia is owned by people who have expressed a willingness to harvest timber. Thus the amount of available forest land (in acres) by unit is:

Northeastern	*Southern*	*Northwestern*	*Total*
2,843,200	3,075,100	2,030,500	7,948,800

Because we have no basis for determining that this land is any more or any less adequately stocked or productive than the average of all privately owned land, we must assume that it is average. If this is true, the growing-stock inventory is about 8,716 million cubic feet (ft^3). This inventory includes an additional 312.2 million ft^3 of wood per year. The growing-stock inventory and growth (in million ft^3) by unit are:

Inventory and growth	*North-eastern*	*Southern*	*North-western*	*Total*
Growing-stock inventory	3,024	3,473	2,219	8,716
Growth per year	111.1	121.8	79.3	312.2

The maximum available inventory volume would be the total supply of available growing stock. The available net growth may be taken as the maximum volume that could be removed each year without depleting the total supply.

A major weakness of this estimate is the assumption that the group of owners who intend to harvest timber will, in fact, do so. These owners control 41 percent of the privately owned commercial forest land in the State. How would these people react if a buyer approached them to sell their timber? Would the owner demand a higher stumpage price than the buyer is willing to pay? Because it is difficult to answer this question, we estimated a minimum level for timber harvesting based on the number of owners who intend to harvest in the next 10 years.

MINIMUM ESTIMATE

Owners who intend to harvest in the next 10 years control the following amount of forest land in each unit (in acres):

Northeastern	*Southern*	*Northwestern*	*Total*
1,136,200	1,986,900	551,200	3,674,300

These acres support 4,055 million ft^3 of growing-stock inventory and have an annual growth of 147.5 million ft^3. The growing-stock inventory and growth by unit (in million ft^3) are:

Inventory and growth	North-eastern	Southern	North-western	Total
Growing-stock inventory	1,209	2,244	602	4,055
Growth per year	45.3	79.9	22.3	147.5

In 1974, an estimated 151.2 million ft^3 of growing stock was removed from private lands in West Virginia. An additional 14.9 million ft^3 of growing stock was removed from the National Forests. The estimated removals by unit in 1974 (in million ft^3) were:

Forest land	North-eastern	Southern	North-western	Total
Private	53.1	74.8	23.3	151.2
Public[1]	12.4	2.5	—	14.9
Total	65.5	77.3	23.3	166.1

Our minimum estimates of annual volume available are very close to the total removals from private lands. Minimum volume estimates and total removals by unit (in million ft^3) are:

Volume and removal	North-eastern	Southern	North-western	Total
Minimum volume available	45.3	79.9	22.3	147.5
1974 private removals	53.1	74.8	23.3	151.2

Owners with definite plans to cut produce most of the harvest. The remainder is from owners who have not made long-range plans.

Total output of industrial products was 106.6 million cubic feet in 1974 (Bones and Glover 1977). The industrial roundwood harvest by unit (in million ft^3) was:

Northeastern	Southern	Northwestern	Total
47.1	41.7	17.8	106.6

[1] Removals from the Monongahela National Forest by unit were estimated by assuming that the removals were distributed by the same ratio as growing stock volumes. Of the growing stock volume of the Monongahela National Forest, 83 percent is in the Northeastern Unit, and 17 percent is in the Southern Unit. The Monongahela National Forest was the only public land on which harvesting occurred.

INTERPRETING THE ESTIMATES

The first estimate gives the volume of timber held by owners willing to harvest. The size, condition, location of the timber, and the restrictions that the owner would place on logging have not been considered. This estimate does not consider the portion of a total forest area that an owner is willing to have cut. The second estimate indicates the volume freely offered for harvest under current market conditions.

No attempt has been made to deduct the 879,700 acres held by forest industry ownerships from these estimates. The reader should note that most of the timber on these lands is not available on the open market. Much of this land is used to ensure a steady supply of raw materials for its industry owner. However, in recent years, many forest industries have sold stumpage or logs when they could realize a better return on their investment by selling the timber than by holding it in reserve for their own use.

TIMBER HARVESTING PRACTICES

WHY OWNERS HARVEST TIMBER

An estimated 41 percent of the owners have harvested timber because they needed the money. These owners own 15 percent of the land held by owners who have harvested. Many hold relatively small tracts and view their timber as a source of money to be used when the need arises. Considering the low income level of many of the landowners in West Virginia, the number of owners who harvest for this reason was not unexpected (Fig. 5).

Owners who harvested because their timber was "mature" or for their own or company use hold an average of 184 and 130 acres, respectively. There is reason to believe that owners of larger tracts of timber have a greater interest in managing their land. Many of these owners are managing their woodland to one degree or another. As estimated 17 percent of the owners have harvested because the timber was mature. These owners control 32 percent of the land owned by harvesters. In addition, 18 percent of the harvesters cut timber for their own or company use. These owners control 24 percent of the land owned by people who have harvested timber.

Figure 5.—Reason for harvesting timber, by percentage of owners and acreage.

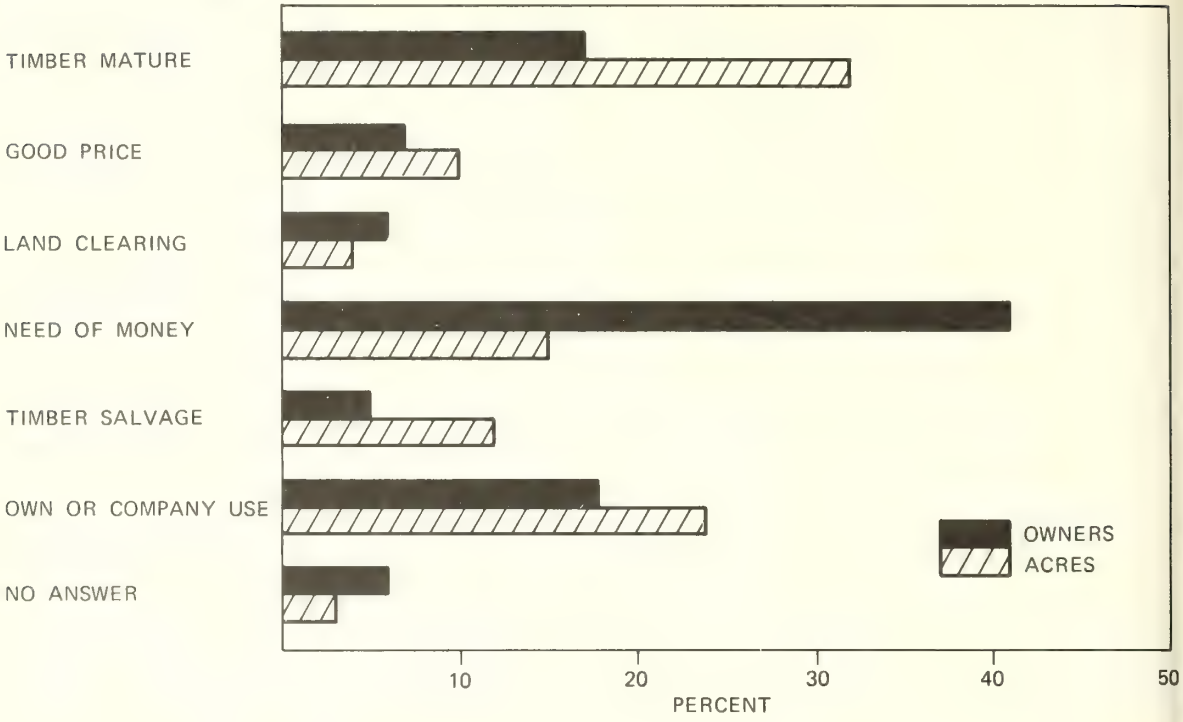
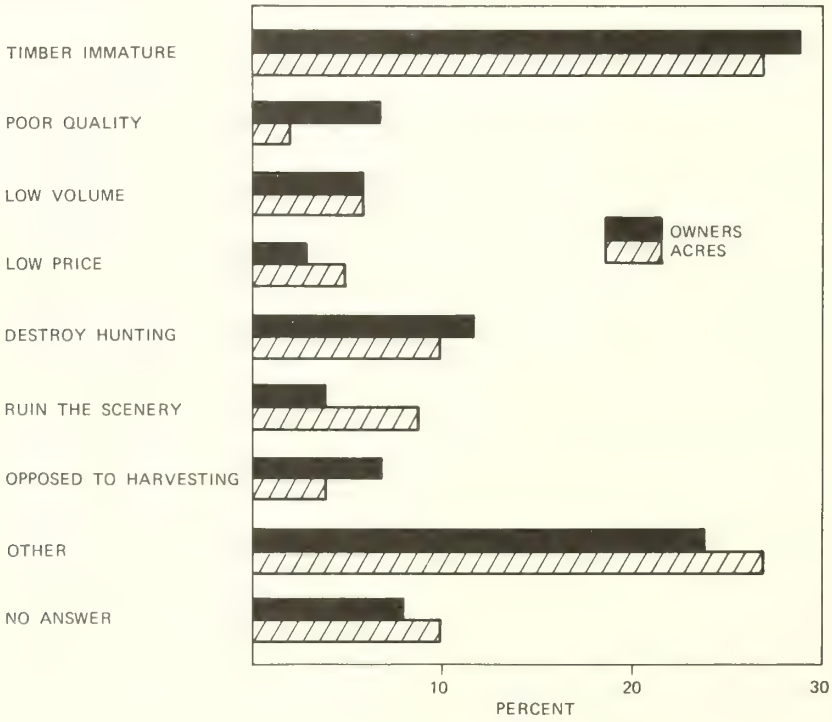


Figure 6.—Reason for not harvesting timber, by percentage of owners and acreage.



WHY SOME OWNERS DO NOT HARVEST TIMBER

In West Virginia, 69 percent of the owners have never harvested timber from their land. These people own 39 percent of the commercial forest land. An estimated 29 percent of these owners say they have not harvested because their timber is immature. These people control 27 percent of the land owned by owners who have never harvested. The greatest concentrations of these owners are in the Northeastern and Northwestern Units, where the largest gains in forest land have occurred since the last forest survey (Bones 1978). These gains are primarily reverting fields where the timber is truly immature (Fig. 6).

Significant numbers of owners in West Virginia have not harvested trees because they feel that harvesting would destroy the hunting or the scenery, or because they are philosophically opposed to harvesting. Together, these groups account for an estimated 23 percent of the owners who have not harvested, and for 23 percent of the land owned by non-harvesters.

PREDICTING OWNER BEHAVIOR

What an owner will do with his forest land is influenced by many factors; people plan their actions for different time periods. We asked owners not only if they intend to cut trees but also when they intend to cut. In previous studies (Kingsley 1976; and Kingsley and Birch 1977) we identified three key questions that predict whether an owner will say that he intends to cut in the next 10 years, possibly, or never. The questions were: what benefits do you expect from your land in the next 5 years; why do you own woodland; and how much woodland do you own.

In West Virginia, the question on expected benefits seems to be the best one for predicting behavior. Owners who consider income from sale of timber as the most important benefit from their land in the next 5 years have the highest probability of harvesting trees. More than 50 percent of the owners who intend to use their woodland as a source of products for themselves, or who expect the increase in land value to be important, can be expected to harvest trees eventually (Fig. 7).

Figure 7.—Percentage of owners who intend to harvest timber and acreage owned, by expected time of harvest and primary benefit expected in the next 5 years.

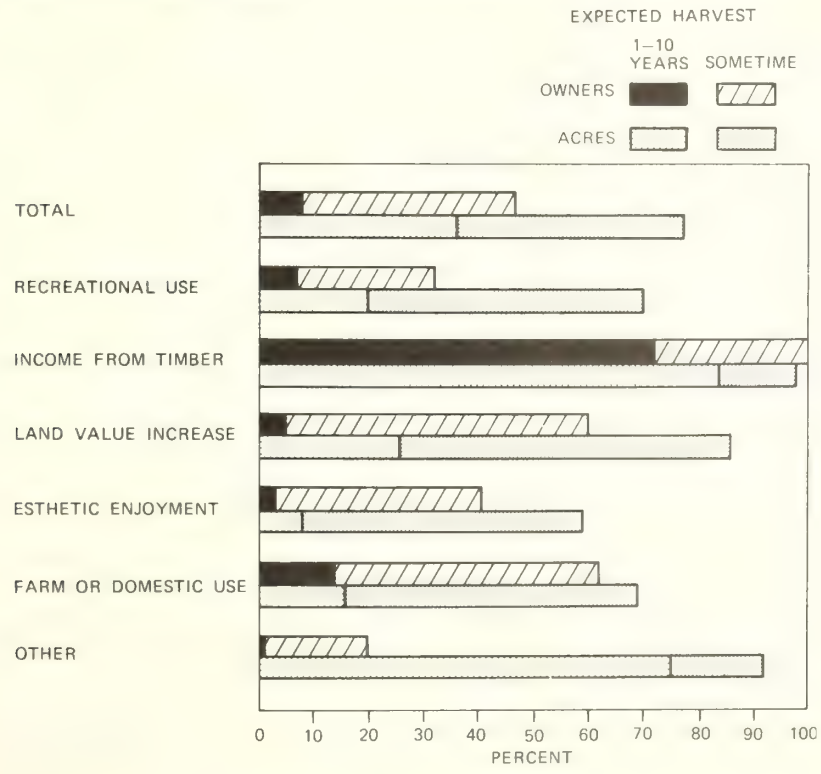
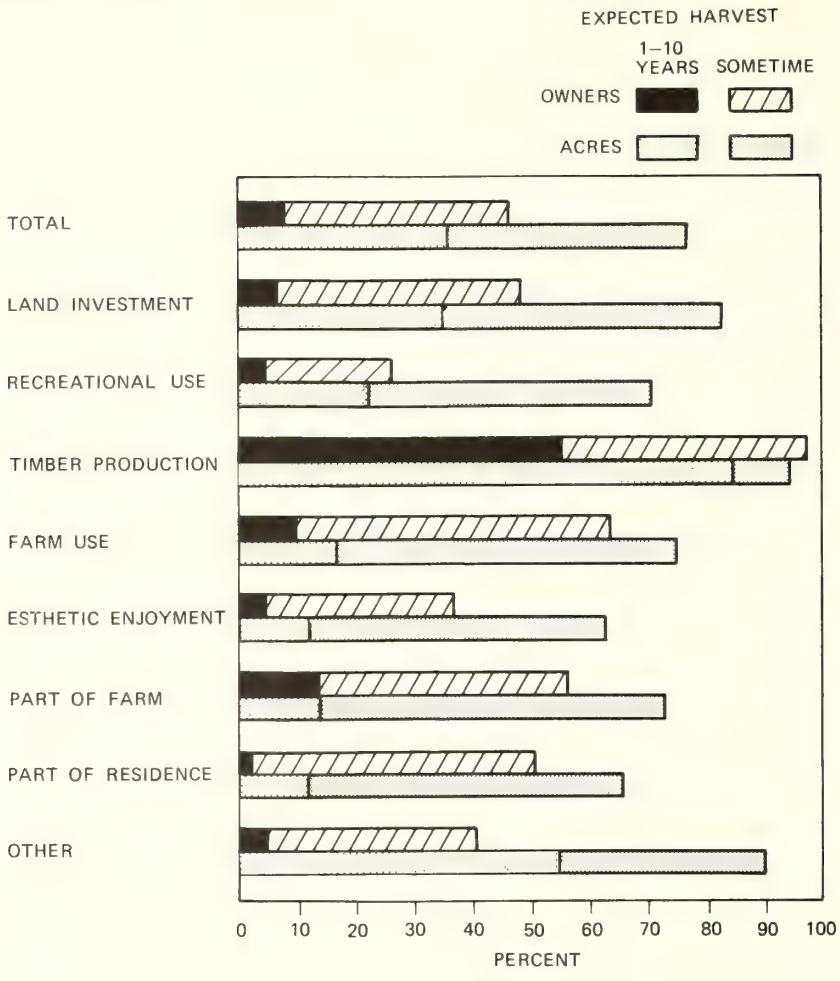


Figure 8.—Percentage of owners who intend to harvest timber and acreage owned, by expected time of harvest and primary reason for owning forest land.



Those owners who expect the primary future benefit to be recreational use, esthetic enjoyment, or "other" can be expected to harvest trees if they have a secondary objective of income from the sale of timber, or if they expect to cut trees for their own use. In general, the owners who intend to harvest also own larger tracts of forest land than the owners who do not intend to harvest.

As with the question on expected benefits, the question on reasons for owning also can be used to predict owner behavior. Owners who say they own forest land for timber production usually add that they intend to harvest forest products within the next 10 years. A few owners say they own woodland for timber production yet add they do not intend to harvest trees. These owners may feel that growing trees is a good activity, but they may not harvest due to old age or because harvesting might be troublesome. They also may feel that they will not own the land when the trees are mature.

More than 50 percent of the owners who own forest land to produce forest products for their own use or as part of their residence can be expected to harvest timber. Owners who say they own woodland as part of the farm but that the woodland serves no useful function in the farm operation will probably say that they intend to harvest eventually (Fig. 8).

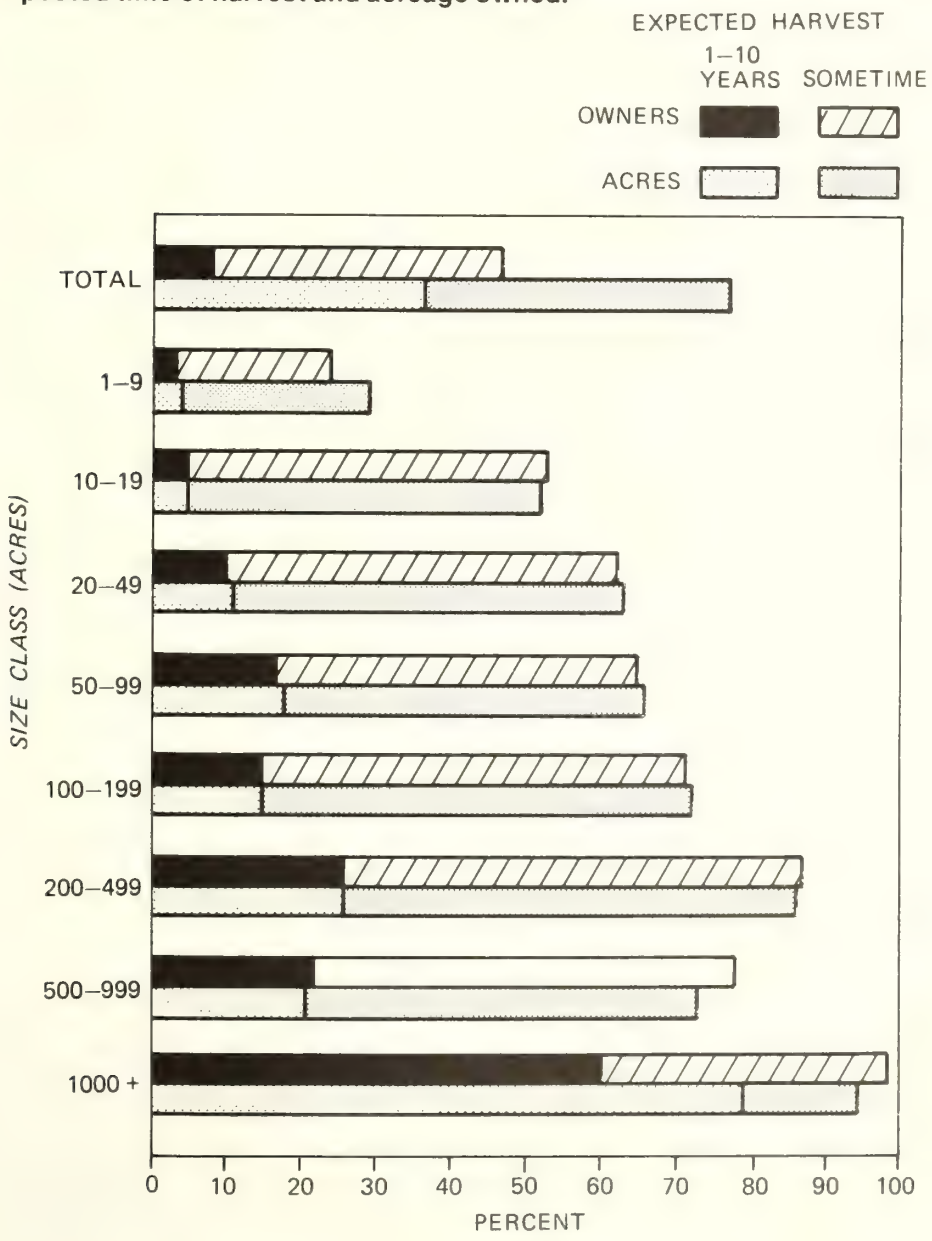
Of the remaining reasons for owning—land investment, recreational use, esthetic enjoyment, and "other"—fewer than 50 percent of the owners can be expected to harvest trees. The owners who will say that they will harvest are likely to have secondary reasons for owning, includ-

ing timber production, and are likely to own larger than average tracts of woodland.

The amount of forest land an individual owns can indicate whether an owner intends to harvest. An owner who holds more than 1,000 acres of commercial forest land almost certainly will harvest eventually, and probably during the next 10 years (Fig. 9).

The only ownership group in which less than 50 percent of the owners expect to harvest is that composed of those who hold fewer than 10 acres of commercial forest land. In most cases, acreage of this size is not likely to interest timber buyers unless it contains high-value trees. These owners might be able to find a buyer if a logger is operating in an adjacent larger tract.

Figure 9.—Percentage of owners who intend to harvest timber, by expected time of harvest and acreage owned.



SOME ASPECTS OF FOREST MANAGEMENT ON PRIVATE OWNERSHIPS

HARVESTING PRACTICES

Seventy-one percent of the landowners who harvested timber chose the area or trees to be harvested. These ownerships account for an estimated 35 percent of the acreage held by harvesters. Two percent of the owners who harvested had a forester select the trees. An additional 1 percent of the owners selected the trees to be harvested with the assistance of a forester. These two groups of owners hold 32 percent of the land owned by harvesters.

An estimated 13 percent of the owners had the buyer select the timber; another 3 percent of the owners made the selection along with the buyer. These two groups of owners account for 24 percent of the land owned by harvesters.

Diameter limit cutting is the most common method of harvesting in West Virginia, though it is seldom used by foresters. Since most timber is sold without the assistance of a forester, buyers often purchase timber in West Virginia down to a certain diameter. This method was used by 32 percent of the owners who harvested timber. These owners account for 35 percent of the land held by harvesters. In West Virginia, the diameter limit is often measured at a given height, usually 1 foot, above the ground on the uphill side of the stump. That sales made in this way are easy to administer is one reason why this method is so popular.

Clearcutting is the second most popular cutting method; an estimated 18 percent of the owners who harvested used this method. However, these owners own only 9 percent of the land owned by harvesters. Of the 11,100 owners who chose clearcutting, 10,000 decided themselves, 1,000 let the buyer choose. Foresters chose this method for fewer than 50 owners. The remaining owners chose clearcutting with the aid of the buyer or a friend.

Selection cutting was chosen by 17 percent of the owners. These owners control 20 percent of the land owned by harvesters. Although an estimated 7,500 owners used this method, many of these owners did not physically mark each tree, considering themselves responsible only for the final decision to harvest. Large ownerships often include many forest types and stand conditions that require different cutting methods. Seven percent of the owners used a combination of cutting methods; these owners hold 16 percent of the land owned by harvesters.

PRODUCTS HARVESTED

Sixty-one percent of the owners harvested only one timber product from their land; they control 33 percent of the land owned by harvesters. Thirty percent of the harvesting owners cut only sawlogs. These owners control 23 percent of the land owned by harvesters. Mine timbers were the sole product harvested by 14 percent of the owners; they hold 3 percent of the land owned by harvesters.

Integrated or multiproduct harvests are becoming commonplace in West Virginia. The larger the ownership, the more likely the owner will harvest more than one product. Five percent of the owners harvested three or more products. These 3,100 owners control almost 2 million acres of forest land, or 31 percent of the land owned by harvesters. The greatest concentration of these ownerships is in the Southern Unit. Forty-eight percent of the land owned by harvesters in this unit is controlled by this ownership group.

FORESTRY ASSISTANCE

An estimated 23,000 owners—11 percent—have received some type of forestry assistance. These owners control 3,752,800 acres of commercial forest land—36 percent of the private commercial forest land in West Virginia.

An estimated 49 percent of the owners do not know what agency to contact for forestry assistance. An additional 26 percent of the owners did not respond to the question on assistance. These two groups own 53 percent of the commercial forest land in West Virginia. Many of these owners have not felt a need for forestry assistance, so they have not attempted to find out where to obtain assistance.

The West Virginia Department of Natural Resources, Division of Forestry, is responsible for forestry assistance to landowners. There are also several consulting foresters and industry foresters who are available to assist owners. Only 11 percent of the owners would contact "the state and county" for forestry assistance; these owners hold an estimated 22 percent of the private commercial forest land. Fourteen percent of the owners would

contact agencies such as the Soil Conservation Service, Forest Service, Agricultural Stabilization and Conservation Service, and the Extension Service. These agencies would put the landowner in touch with the appropriate agency for his needs.

Fewer than 500 owners—less than 0.5 percent—would contact a consulting or industry forester. However, these owners control 16 percent of the private commercial forest land in the State. Many of these large ownerships have full- time foresters or employ consultants.

Of the estimated 23,000 owners who received assistance (from both public and private foresters), 10,400 owners participated in timber stand improvement. Only 2,600 owners said they received general forest-management assistance; these owners control 21 percent of the private commercial forest land in the State. The remaining owners received assistance in areas such as tree planting, timber stand evaluation, surveying, and timber marking. It is interesting to note that only 1,600 owners who actually had timber harvested from their land had a forester select or help select the trees to be cut. However, an estimated 3,300 owners were asked if they have ever received forestry assistance would reply that they have received assistance in marking timber. Apparently many owners make the initial decision to harvest timber and then call in a forester to mark specific trees for cutting. There is undoubtedly some timber that has been marked but is not yet sold.

RECREATION ON PRIVATE FOREST LAND

Sixty percent of all forest-land owners in West Virginia allow the public to use their woodlands for some form of recreation. These owners control 65 percent of the private commercial forest land. No single recreational activity is allowed by more than half the owners. An estimated 49 percent of the owners allow hunting; 37 percent allow hiking; 21 percent, picnicking; 17 percent, camping; 11 percent, snowmobiling; and 5 percent, fishing. The owners who allow hunting own 58 percent of the land; owners who allow hiking own 44 percent; picnicking, 33 percent; camping, 30 percent; snowmobiling, 11 percent; and fishing, 26 percent.

Twenty-four percent of the owners post their land against hunting or trespassing. These owners control an estimated 35 percent of the private forest land in the State. Of the 50,600 owners who post their land, 12,900 do so to control hunting. Another 10,400 post to control access. The remaining owners would post to prevent the abuse of their property, for personal safety, or to protect themselves from liability. When an owner indicates that he wishes to control hunting or access, he often wishes to know only who is using his land or to exclude only individuals he deems undesirable.

It seems that a recreationist who contacts the owner beforehand is likely to obtain permission to use the land. Conversely, land that is not posted might not be available for recreational use; 24 percent of the owners post their land, yet 30 percent do not allow public use of their woodlands.

LANDOWNER INTERESTS

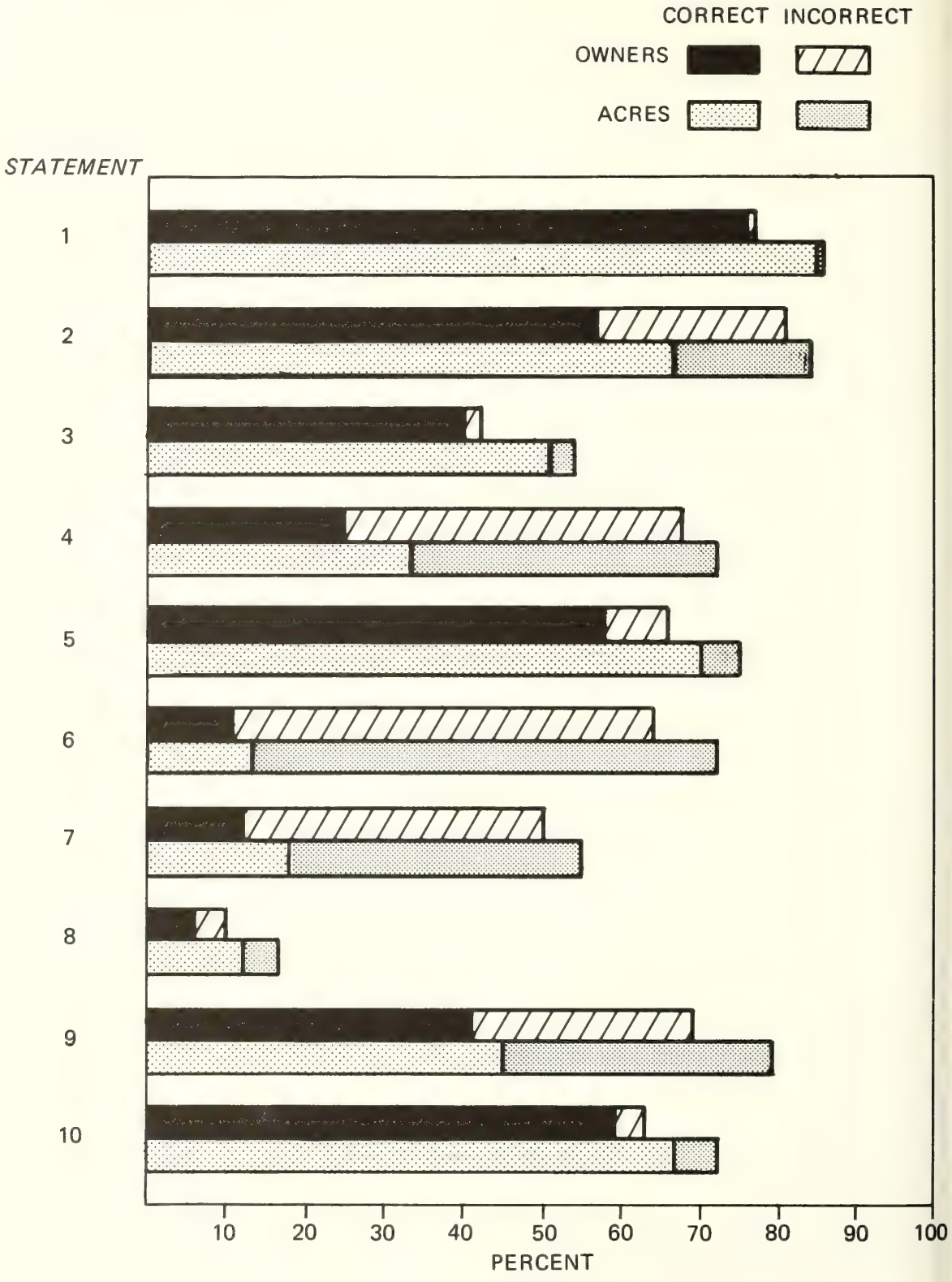
To better understand owner interest and motivation we asked owners to list the organizations in which they were active, and the publications they received. We also asked these questions to find a medium of communication to forest-land owners. Often, programs to aid landowners are not well accepted simply because owners are not aware that these forest-management programs exist.

We estimate that only 17 percent of the individual owners are members of organizations that are farm or conservation related. These owners own 21 percent of the individually owned forest land in West Virginia. Three percent of the individual owners are members of a sportsman's club of some type. We were unable to identify a similar group or organization whose membership includes more than 2 percent of the forest-land owners.

An estimated 36 percent of the owners receive some type of farm or conservation related publication. These people own 42 percent of the forest land owned by individuals. "Field and Stream" led all publications; we estimate that 17 percent of the individual owners receive this publication.

The West Virginia conservation magazine "Wonderful West Virginia" has the second highest circulation among individual forest-land owners; we estimate that 11 percent of the individual owners receive this publication. Thus, on a statewide basis, "Wonderful West Virginia" might be used as a vehicle to spread forest-management information.

Figure 10.—Responses to 10 true-false statements, by owners and acreage, in percent.



CONSERVATION QUIZ

To find out how forest-land owners define certain forestry terms, we asked our sample owners to complete a 10-statement true-false quiz. We encouraged them to check "don't know" rather than guess. From this quiz we estimated how all individual forest-land owners in West Virginia would respond. The responses considered correct are those that a professional conservationist would give.

1. Conservation means that natural resources should be used wisely.

Answer: True

We estimate that 76 percent of the individual forest-land owners would respond correctly (Fig. 10). These owners control 85 percent of individually owned commercial forest land in the State. This statement had the highest percentage of correct answers.

2. Once a forest is cut it will not grow back unless planted.

Answer: False

Fifty-seven percent of the owners would respond correctly. These owners hold 68 percent of the individually owned forest land.

3. Sustained yield is an important forestry objective.

Answer: True

Only 40 percent of the owners would respond to this statement with the correct answer. These owners hold 51 percent of the individually owned forest land. More owners would respond "don't know" to this statement than would respond correctly.

4. Clearcutting is always bad forestry

Answer: False

Clearcutting is an emotional issue in West Virginia. Forty-three percent of the individual owners in West Virginia would give the incorrect response. Only 25 percent of the individual owners would consider this statement as false—the correct answer from a forester's point of view.

5. All forest land in the United States is managed.

Answer. False

Fifty-eight percent of the owners would respond correctly, these owners control 70 percent of the individually owned commercial forest land in West Virginia.

6. Selective logging is always good forestry.

Answer: False

This statement is almost the opposite of Statement 4. Selective logging is not always "good" anymore than clearcutting is always "bad". Only 11 percent of the individual owners would respond correctly.

7. Commercial forest land is forest land that is owned by wood-using industries.

Answer: False

Only 12 percent of the owners would give the correct response. Commercial forest land, by our definition, is forest land that is producing or capable of producing crops of industrial wood, and that is not withdrawn from timber utilization.

8. An ecosystem is any complex of living organisms together with their environment that is isolated for study.

Answer: True

This statement was designed so that only persons with a detailed knowledge of conservation would be expected to give the correct response. This statement produced a bonus: we determined how many people guessed. We estimate that 77 percent of the individual owners would say that they don't know whether this statement is true or false. These responses show that *most* owners made a sincere effort when given the quiz.

9. A virgin forest is any forest of old or large trees.

Answer: False

Forty-one percent of the individual owners would give the correct response. These owners own 45 percent of the individually owned commercial forest land.

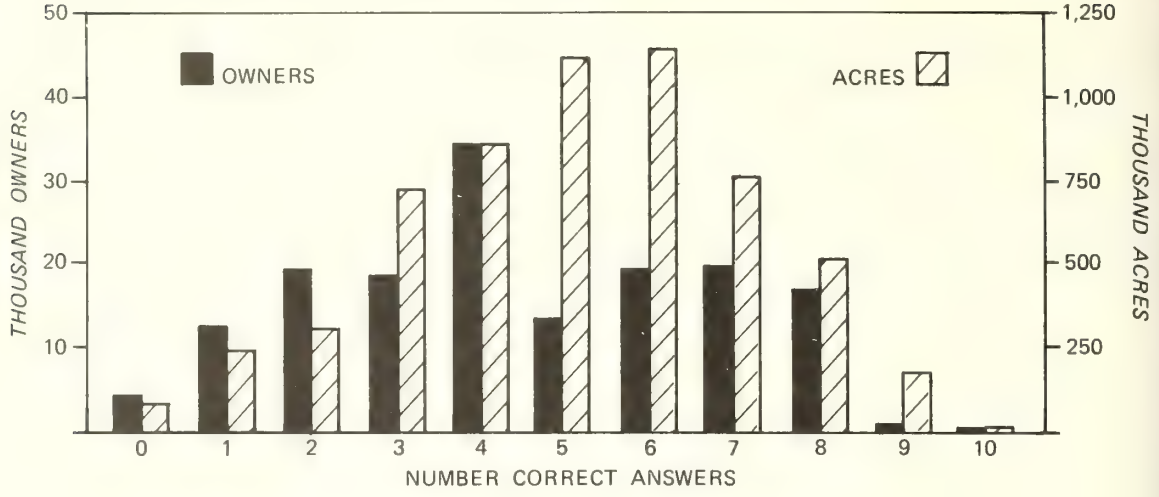
10. Stumpage price is the price paid for standing timber.

Answer: True

This statement had the second highest percentage of correct responses; 59 percent of the individual owners would respond to this statement with the correct answer. These owners control 67 percent of the individually owned commercial forest land.

The wide range of percentages of correct responses (from 76 down to 6) was desired because we wanted to establish a depth of knowledge. Some owners responded incorrectly to all 10 statements, and one individual owner gave 10 correct responses (Fig. 11). Overall, the scores confirmed what we expected; that is, many of the terms used for various aspects of forestry are misunderstood.

Figure 11.—Estimated number of forest-land owners and acreage owned, by number of correct answers on conservation quiz.



CONCLUSION

There is potential to expand timber production from private lands in West Virginia. There are 96,800 private landowners who express some inclination to harvest timber "some time" from their forest lands. These owners control 77 percent of the private commercial forest land in the State.

Good forestry practice could increase the income of many forest-land owners. As 102,600 of the 182,100 individual owners earn less than $10,000 per year, the economic needs of today's owners are of immediate concern.

The owners of 36 percent of the private commercial forest land have received forestry assistance. Nearly half of the owners don't know how to obtain assistance. How do we reach these owners? Our study shows that no single organization or publication reaches more than 20 percent of the owners. Information on forestry programs must be sent out through many channels if these programs are to reach the people for whom they are intended.

Misinformation is also a problem in West Virginia. Many commonly used forestry terms are not understood by owners of forest land. We must do a better job of explaining terms such as sustained yield, clearcutting, and selective logging.

Uses of the land other than for timber are quite common in West Virginia. Sixty percent of all forest-land owners in the State allow some form of public use of their woodlands for recreation. Nonrenewable subsurface resources such as coal, oil, gas, and other minerals also influence what happens to the forest resource. In West Virginia, separate ownership of surface and subsurface rights is common.

LITERATURE CITED

Bones, James T.
1978. **The forest resources of West Virginia.** U. S. Dep. Agric. For. Serv. Resour. Bull. NE-56, 105 p.

Bones, James T., and Ralph P. Glover, Jr.
1977. **The timber industries of West Virginia.** U. S. Dep. Agric. For. Serv. Resour. Bull. NE-47. 16 p.

Kingsley, Neal P.
1976. **The forest-land owners of Southern New England.** U. S. Dep. Agric. For. Serv. Resour. Bull. NE-41. 27 p.

Kingsley, Neal P., and Thomas W. Birch.
1977. **The forest-land owners of New Hampshire and Vermont.** U. S. Dep. Agric. For. Serv. Resour. Bull. NE-51. 47 p.

Marler, R. L., and P. F. Graves.
1974. **A new management rationale for small forest-land owners.** AFRI Res. Rpt. No. 17, SUNY Coll. Environ. Sci. For. Syracuse. 17 p.

U. S. Bureau of the Census.
1969. **Census of Agriculture; West Virginia: Vol. 1.** U. S. Dep. Commer., Washington, D. C.

APPENDIX

STUDY METHOD

The sampling scheme used in this study was derived from the sampling design used in the forest survey by the Northeastern Station. Resources Evaluation field crews attempted to obtain the correct name and mailing address of the owner of each of the 1,149 privately owned forested field plots in the State. These plots are uniformly distributed within each survey unit. The field crews obtained usable addresses for more than 90 percent of the field plots. A total of 1,029 questionnaires were mailed to owners of commercial forest land in West Virginia; 710 were returned with usable information.

The questionnaire was developed after investigation of several earlier ownership studies, and consultations with other investigators. It was field tested before the mass mailing. The mailing consisted of the questionnaire plus a cover letter explaining the purpose of the survey. Approximately 2 weeks after the first mailing, those addressees who had not responded were mailed a second copy of the questionnaire and the cover letter, plus a second letter urging cooperation with the study. Approximately 1 month later, 450 owners had responded. Then a 100-percent field canvass of nonrespondents was undertaken by personnel of the Division of Forestry, West Virginia Department of Natural Resources. This effort resulted in an additional 260 usable questionnaires. The 710 questionnaires represented 861 of the privately owned forested field plots—75 percent.

The probability that a forest-land owner will be sampled depends on the rate of sampling and the amount of commercial forest land he owns. Each unit in West Virginia had a different rate of sampling. The West Virginia Division of Forestry is organized into six districts. These district boundaries do not match the forest survey units. Each district had a different rate of success in persuading nonrespondents to reply. Both the survey rate of sampling and the district success rate affect the probability that an owner will be included in the final tabulations. The combination of units and districts produces nine sampling areas in West Virginia.

The total acreage of privately held commercial forest land for each sampling unit was obtained from the forest survey. Also obtained was a complete list of owners holding more than 30,000 acres of forest land. These ownerships were treated as an enumeration and subtracted from the total amount of privately owned forest land. The area represented by each forest plot not held by an owner with more than 30,000 acres was calculated by dividing the total amount of private forest land, less that held by large owners, by the number of valid plots less those held by large owners. Using this representative area, we estimated remaining number of forest-land owners.

Since the sampling scheme is essentially the same as that used for the forest survey, owners of small parcels of woodland have little chance of being included in the sample. To estimate the total number of persons who own commercial forest land in West Virginia, it was necessary to weight the numbers of owners obtained in the sample. This procedure can be stated as:

$$N = \frac{CFL_p}{N_r} \sum \frac{1}{A_i}$$

and $\sum N$ = estimated number of private owners in the State,

where

N = estimated number of private owners in the sampling area.

CFL_p = the acres of privately owned commercial forest land in the sampling area.

N_r = number of respondents in the sampling area.

A_i = acres owned by individual respondents.

The resulting number of owners is an unbiased estimate of the total number of persons who own commercial forest land in West Virginia.

The data were compiled using the FINSYS generalized computer system. (Wilson, Robert W., Jr., and Robert C. Peters, 1967. The Northeastern Forest Inventory Data Processing System I: Introduction. U. S. Dep. Agric. For. Serv. Res. Pap. NE-61, 20 p., illus.)

The area of privately owned land in each sampling area, other than in the 30,000 acre and over class, was divided by the number of fields plots represented. Thus, if a particular respondent owned land on which one forested plot was located, his response was given a weight of one. If a respondent represented two forested plots, his response received a weight of two, or double the acreage, and so on.

It was also necessary to determine if those questionnaires obtained through the mail and those obtained by means of follow-up in the field were samples of the same population. The hypothesis tested was that there was no significant difference in the mean acreage between subsamples. Student's t-test showed no significant differences at the 99 percent level.

Because this study encompasses nine sampling areas, data have been aggregated to the forest survey units. The following tabulation shows the pertinent data for each unit:

Unit	Useable questionnaires	Survey plots	Average area per plot
Northeastern	273	305	11,702
Southern	198	303	12,187
Northwestern	239	253	12,179
Total	710	861	12,012

SAMPLING ERRORS

Sampling errors were calculated for the estimated total number of forest-land owners in each unit and for the combined total. The sampling error for the number of acres of commercial forest land in private ownership was calculated as part of the forest survey. The user of these data is cautioned that, as the size of any estimate decreases in relation to the total estimate, the sampling error, expressed as a percent of the estimate, increases drastically. The inclusion of small woodland parcels (10 acres and less) in the study population substantially influences the sampling error for the estimated number of owners.

Unit	*Sampling error Private commercial forest land*	
	Acres	*Percent*
Northeastern	±91,000	±2.55
Southern	±126,000	±3.42
Northwestern	±89,400	±2.90
Total	±179,406	±1.73

For a discussion of the method of calculating these sampling errors see: Cochran, William G. 1963. Theory for selection with arbitrary probabilities. p. 252 *In* Sampling Techniques. 2nd ed. John Wiley and Sons, New York.

DEFINITION OF TERMS

Average annual net growth of growing stock. The change (resulting from natural causes) in volume of sound wood in sawtimber and poletimber trees during the period between surveys, divided by the length of the period. Components of annual net growth of growing stock include the increment of net volume of trees present at the beginning of the period and surviving to its end, plus net volume of trees reaching poletimber size during that period, minus the net volume of trees that died during the period, minus cull increment (the net volume of trees that became rough or rotten during the period).

Board foot. A unit of lumber measurement 1 foot long, 1 foot wide, and 1 inch thick, or its equivalent. By Resources Evaluation convention, softwoods less than 9.0 inches in dbh and hardwoods less than 11.0 inches in dbh do not contain board-foot volume.

Clearcutting. The method of regenerating timber in which the area is cut clear in the literal sense of the word; virtually all the trees, large and small, are removed. The term is often erroneously applied to any type of cutting in which all the merchantable timber is removed and all that is not merchantable is left standing.

Commercial forest land. Forest land that is producing or capable of producing crops of industrial wood (more than 20 ft^3/acre/year) and that is not withdrawn from timber utilization. (Industrial wood is all roundwood products except fuelwood.)

Diameter limit. The method of regenerating timber in which all trees above a specified diameter are removed.

Unit	Estimated population		More than 10 acres	
	Owners	Sampling errors	Owners	Sampling errors
Northeastern	73,400	21	37,300	9
Southern	57,200	23	30,000	11
Northwestern	76,900	12	51,400	7
Total	207,500	11	118,700	5

Forest industries. Companies or individuals operating wood-using plants.

Forest land. Land that is at least 16.7 percent stocked (contains at least 7.5 ft^2 of basal area) by forest trees of any size, or that formerly had such tree cover and is not currently developed for non-forest use. (Forest trees are woody plants that have a well developed stem and usually are more than 12 feet in height at maturity.) The minimum area for classification of forest land is 1 acre.

Growing-stock trees. Live trees of commercial species that are classified as sawtimber, poletimber, saplings, and seedlings; that is, all live trees of commercial species except rough and rotten trees.

Growing-stock volume. Net volume, in ft^3, of growing-stock trees that are 5.0 inches in dbh or larger, from a 1-foot stump to a minimum 4.0-inch top diameter outside bark of the central stem.

Hardwoods. Dicotyledonous trees, usually broad-leaved and deciduous.

Private commercial forest land. All commercial forest land other than that owned by federal, state, or local governments or their agencies.

Pulpwood. Any log from which woodpulp is to be made; usually measured in bolts of 4, 5, or 8 feet, and somewhat smaller in diameter than sawlogs or veneer logs.

Sawlog. Any log from which lumber is to be sawn.

Sawtimber trees. Live trees of commercial species: (a) that are of the following minimum diameter at breast height: softwoods, 9.0 inches and hardwoods 11.0 inches, and (b) that contain at least one 12-foot or two noncontiguous 8-foot merchantable sawlogs, and that meet regional specifications for freedom from defect.

Sawtimber volume. Net volume in board feet, International 1/4-inch rule, of merchantable sawlogs in live sawtimber trees. Net volume equals gross volume less deductions for rot, sweep, and other defects that affect use for lumber.

Selection system. The method of regenerating timber in which trees of all sizes are harvested. However, in practice, frequently only the oldest or largest trees in a stand are harvested. Trees are taken singly or in small groups, but the entire stand is never cleared completely in a single operation.

Softwoods. Coniferous trees, usually evergreen, with needles or scalelike leaves.

Stand. A growth of trees on forest land.

Timber removals. The volume of growing-stock or sawtimber trees harvested or killed in logging or in cultural operations such as timber stand improvement, land clearing, or changes in land use.

Timber salvage. Removals of down, damaged, or diseased trees.

Veneer log. Any log from which veneer is to be made, by peeling (rotary cutting) or slicing.

METRIC EQUIVALENTS

One acre = 4,068.8 square meters (m^2) or 0.405 ha
One thousand acres = 405 ha
One million acres = 405,000 ha
One cubic foot (ft^3) = 28,317 cubic centimeters (cm^3) = 0.0283 cubic meters (m^3)
Breast height = 1.3716 meters (m) above ground
One foot = 30.48 centimeters (cm) or 0.3048 m
One mile = 1.609 kilometers (km)
One square foot (ft^2) = 929.03 square centimeters (cm^2) or 0.0929 m^2

QUESTIONNAIRE

NE FOREST EXPERIMENT STATION
FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE

OMB 40-R-3941

NORTHEASTERN WOODLAND OWNERSHIP STUDY

State _____
County_____
Plot _____

Please complete the following questions to the best of your knowledge. Where actual data are not available please use your best estimate. Please be assured your answers will be held strictly confidential. If you do not now own woodland, please answer questions 1 and 2 and return the questionnaire.

1. How much land do you now own? (Include woodlands, pasture, cropland, etc., but exclude individual house lots.) Acres_____

2. Of all of the land you own how much is woodland? Acres_____ or percent____

3. Is all of the woodland you own in one state?

   Yes _____ What state?_____

   No _____ My woodlands are in more than one state as follows:

   _____ acres in _____ (state)

   _____ acres in _____ (state)

   _____ acres in _____ (state

   _____ acres in _____ (state)

4. How many individual tracts or parcels of woodland do you own? Number_____

5. In what year did you first acquire woodland? Year _____

6. How did you acquire the major portion of the woodland you now own?

Purchase	1.	_____
Inheritance	2.	_____
Other	3.	_____

7. In which one of the following ownership categories does the major portion of your woodland holdings fall? (Please check only one.)

		Check one
Individual (include husband and wife)	1.	_____
Joint ownership	2.	_____
Undivided estate	3.	_____
Partnership	4.	_____
Corporation	5.	_____
Club or association	6.	_____
Other	7.	_____

8. If the ownership is a partnership, corporation, club or association, what is the nature of the business or organization?

_____

Please indicate the title of the person completing this questionnaire.

_____

9. What is the approximate road mileage from your home to your nearest and furthest tract of woodland? (For businesses or organizations consider "home" to mean place of business, or location of organization.)

Miles to the nearest tract (enter zero if you live on the tract). _____

Miles to the furthest tract. _____

10. How many times have you or your representative visited your nearest and furthest tract of woodland in the last 12 months?

Number of visits to the nearest tract _____

Number of visits to the furthest tract _____

11. Which statement most accurately describes your woodland?

Check one

a. Most of the trees are sugar (hard) maple, beech, and yellow birch. _____

b. Most of the trees are red (soft) maple, elm, and ash. _____

c. Most of the trees are oaks, hickories, gums, and yellow-poplar. _____

d. Most of the trees are pines. _____

e. Most of the trees are softwoods other than pines. _____

f. None of the above apply. Please describe your woodland briefly: _____

_____

g. I do not know what kinds of trees are on my land. _____

12. Which statement most accurately describes average size of the trees in your woodland?

Check one

a. The average tree is 5 inches in diameter or smaller. _____

b. The average tree is between 5 and 12 inches in diameter. _____

c. The average tree is 12 inches in diameter or larger. _____

d. I don't know how big the trees are. _____

13. Have you ever harvested timber or trees from your land?

Yes 1._____ No. 2._____

NOTE: IF YOU HAVE NEVER HARVESTED TIMBER OR TREES FROM YOUR WOODLAND SKIP TO QUESTION 22.

14. In what year did the most recent timber harvest take place? _____

15. What percent of your woodland was involved in the most recent timber sale? _____

16. What percent, if any, of your woodland do you feel you would never harvest timber from? _____

17. What products were harvested? (Check as many as apply.)

		Check			Check
Sawlogs	1.	_____	Mine timbers	6.	_____
Veneer logs or bolts	2.	_____	Christmas trees	7.	_____
Pulpwood	3.	_____	Other (please specify)_____	8.	_____
Turnery bolts	4.	_____	Don't know what products were harvested	9.	_____
Posts, poles, or piling	5.	_____			

18. Please indicate amounts of products harvested.

Product	Amount	Unit of measure
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

19. How were your trees selected for harvesting? (Please check only the method that accounted for the greatest volume, if more than one method was used.)

	Check one
Selection (only preselected market trees were removed).	1. _____
Diameter limit (only trees over a minimum diameter were removed). Please indicate minimum diameter _____	2. _____
Clearcutting (most or all of the trees on a given area were removed).	3. _____
Land clearing (trees were harvested incidental to clearing the land for a use other than woodland).	4. _____
Other (please specify) _____	5. _____
Don't know method used.	6. _____

20. Who selected the area or trees to be harvested?

	Check one
1. Landowner	_____
2. Forester	_____
3. Friend or neighbor	_____
4. Timber buyer or logger	_____
5. Combination of _____ and _____	_____

21. If you did not have the assistance of a forester in the harvesting of your timber, do you now wish you had?

	Check
Yes	_____
No	_____
No feeling either way	_____
If yes, why _____	_____

22. Why did you harvest timber at the time that you did? (Check only the one reason you consider most important.)

		Check one
Felt timber was mature	1.	_____
Offered a good price	2.	_____
Land clearing	3.	_____
Needed money	4.	_____
Needed timber for own use	5.	_____
Timber harvest for company use (industry only)	6.	_____
Other (please specify) _____	7.	_____

23. If you have never harvested timber or trees from your land, why not? (Please check only the reason you consider most important).

		Check one
Woodland immature - timber too small	1.	_____
No market for timber	2.	_____
Price offered or prevailing market price too low	3.	_____
Value of land for hunting would be destroyed	4.	_____
Selling or plan to sell the land	5.	_____
Scenery would be destroyed	6.	_____
Land tied up in estate	7.	_____
Distrust of loggers	8.	_____
Opposed to timber harvesting	9.	_____
Poor quality timber	10.	_____
Not enough volume	11.	_____
Logging would create a fire hazard	12.	_____
Insufficient area to harvest	13.	_____
Other (please specify) _____	14.	_____

24. Do you plan to harvest timber from your woodlands in:

	Check one
Next 5 years	1. _____
5 to 10 years	2. _____
Possibly at some future date	3. _____
Never plan to harvest	4. _____

25. Have you ever sought the assistance of a forester for advice or help in managing your woodland?

Yes _____ Please indicate the nature of assistance. _____

_____

No _____

26. What office, agency, or individual would you contact for forestry assistance? (If you don't know, please write in "don't know.")

_____

27. Why do you own woodland? (Please rank in order of importance those items that are applicable, with number 1 the most important.)

	Rank
Land investment (hope to sell all or part of my woodland at a profit).	____
Recreation (hunting, camping, fishing, etc.).	____
Timber production (growing timber or other forest products for sale).	____
Farm or domestic use (source of forest products for own use, i.e., firewood, fence posts, etc.).	____
Aesthetic enjoyment (the desire to have woodland and "green space" around my home).	____
Part of the farm (the woodland is part of the farm but serves no useful function in the farm operation).	____
Part of my residence.	____
Other (please specify) _____	____

28. Which of the following do you feel were the most important benefits you derived from your woodland in the last 5 years? (Please rank in order of importance those items that are applicable, with number 1 the most important.)

	Rank
Increase in land value (investment).	____
Recreation (hunting, fishing, camping, etc.).	____
Income from the sale of timber.	____
Aesthetics (just enjoy woodland, wildlife, and the general satisfaction of owning "green space").	____
Farm and domestic use.	____
Other (please specify) _____	____

29. Which of the following do you feel will be the most important benefits you expect to derive from your woodland in the next 5 years? (Please rank in order of importance those items that are applicable, with number 1 the most important.)

	Rank
Increase in land value (investment).	____
Recreation (hunting, camping, etc.).	____
Income from sale of timber.	____
Aesthetics (just enjoy woodland, wildlife, and the general satisfaction of owning "green space").	____
Farm or domestic use.	____
Other (please specify) _____	____

30. Is the general public, other than your family and immediate circle of friends, permitted to use your woodland for any of the following?

		Check
Hiking	1.	____
Picnicking	2.	____
Camping	3.	____
Fishing (check only if fishing is available)	4.	____
Hunting	5.	____
Snowmobiling	6.	____
Other (Please specify)	7.	____
Public use not permitted	8.	____

31. Is your land posted?

No _____, go to next question.

Yes_____, why is it posted? _____

32. Have you been approached to sell all or part of your woodland in the last five years?

Yes_____ No_____

33. Are you an active member of any of the following organizations? (Please check those you are a member of.)

		Check
American Forestry Association	1.	____
Ohio Forestry Association	2.	____
Pennsylvania Forestry Association	3.	____
Isaac Walton League	4.	____
Audubon Society	5.	____
Natural History Society	6.	____
National Wildlife Federation	7.	____
A Sportsman's Club	8.	____
A Garden Club	9.	____
National Farmer's Organization	10.	____
The Grange	11.	____
The American Tree Farm Program	12.	____
The Sierra Club	13.	____
Any other organizations similar to those listed above (Please specify)_____	14.	____
No, I don't hold membership in any of the above.	15.	____

34. Do you or any member of your household subscribe to any of the following magazines? (Please check those that apply.)

		Check
Tree Farm News	1.	____
American Forests	2.	____
National Wildlife	3.	____
Forest Farmer	4.	____
Ohio Woodlands	5.	____
Pennsylvania Forests	6.	____
Pennsylvania Game News	7.	____
Audubon Magazine	8.	____
National Parks and Recreation	9.	____
Field and Stream	10.	____
Sports Afield	11.	____
Kentucky Farmer	12.	____
Agway Cooperator	13.	____
Ranger Rick Nature Magazine	14.	____
Our Heritage	15.	____
Forests and People	16.	____
Ohio Farmer	17.	____
Maryland Conservation	18.	____
West Virginia Conservation	19.	____
Pennsylvania Farmer	20.	____
Any other magazine similar to those listed above (Please specify) _____	21.	____
No, I don't subscribe to any of the above magazines.	22.	____

35. Please indicate whether each of the following statements is true or false. If you feel you don't know, don't guess, please check "Don't Know" column.

	True	False	Don't Know
a. Conservation means that natural resources should be used wisely.	____	____	____
b. Once a forest is cut it will not grow back unless planted.	____	____	____
c. Sustained yield is an important forestry objective.	____	____	____
d. Clearcutting is always bad forestry.	____	____	____
e. All forest land in the United States is managed.	____	____	____
f. Selective logging is always good forestry.	____	____	____
g. Commercial forest land is forest land that is owned by wood-using industries.	____	____	____
h. An ecosystem is any complex of living organisms together with their environment that is isolated for study.	____	____	____
i. A virgin forest is any forest of old or large trees.	____	____	____
j. Stumpage price is the price paid for standing timber.	____	____	____

The following questions are asked to classify responses on the basis of information about the owner personally. Again, we would remind you that the answers to these questions, and to any other questions on this questionnaire are strictly confidential. All answers will be compiled in such a manner that it will be impossible to identify any individual reply.

These questions do not pertain to and should not be answered by corporations and organizations.

If the woodland is owned by more than one person, the following questions should be answered for the person to whom the questionnaire is addressed.

36. During the first 12 years of the owner's life where did he live most of the time?

		Check one
In a city with a population of 100,000 or more	1.	_____
In a city with a population of 10,000 to 99,999	2.	_____
In a town or city with a population of less than 10,000	3.	_____
In a rural area	4.	_____
On a farm	5.	_____

37. What is the sex of the owner?

Male _____ Female _____

38. What is the age of the owner?

		Check one
Under 25	1.	_____
25-44	2.	_____
45-64	3.	_____
65 and over	4.	_____

39. How many years of formal education has the owner completed?

		Check one
Grades 1- 8	1.	_____
Grades 9-12	2.	_____
Has some schooling beyond high school (business technical school, or some college)	3.	_____
Has a bachelor's degree or equivalent	4.	_____
Has some graduate work	5.	_____
Holds a master's degree	6.	_____
Holds a doctoral degree	7.	_____

40. What is the primary occupation of the owner? _____

41. In which category would the owner's personal gross income from all sources fall?

		Check one
Less than $10,000	1.	_____
$10,000 to $14,999	2.	_____
$15,000 to $19,999	3.	_____
$20,000 to $24,999	4.	_____
$25,000 to $29,999	5.	_____
$30,000 or more	6.	_____

42. Comments?

INDEX TO TABLES

Table No.

1. Estimated number of private owners of commercial forest land and acres owned, by size class of ownership and geographic unit, West Virginia 1975.
2. Estimated number of private owners of commercial forest land and acres owned, by form of ownership and geographic unit, West Virginia 1975.
3. Estimated number of corporate owners of commercial forest land and acres owned, by nature of business, West Virginia 1975.
4. Estimated number of individual owners of commercial forest land and acres owned, by occupation and geographic unit, West Virginia 1975.
5. Age class of individual owners, by number of owners, acres of commercial forest land owned, and geographic unit, West Virginia 1975.
6. Years of formal education of individual owners, by number of owners, acres of commercial forest land owned, and geographic unit, West Virginia 1975.
7. Individual owners by income group, acres of commercial forest land owned, and geographic unit, West Virginia 1975.
8. Early life environment of individual owners, by number of owners, acres of commercial forest land owned, and geographic unit, West Virginia 1975.
9. Estimated number of owners of commercial forest land and acres owned, by period of ownership and geographic unit, West Virginia 1975.
10. Estimated number of individual owners and acreage owned, by period of ownership and geographic unit, West Virginia 1975.
11. Estimated number of owners of commercial forest land and acreage owned, by distance from tracts and number of tracts owned, West Virginia 1975.
12. Estimated number of owners and acreage owned, by distance from nearest tract and geographic unit, West Virginia 1975.
13. Estimated number of owners and acreage owned, by number of tracts owned and geographic unit, West Virginia 1975.
14. Primary reason for owning commercial forest land, by number of owners and acreage owned, and geographic unit, West Virginia 1975.
15. Primary reason for owning commercial forest land, by number of owners who have harvested timber, acreage owned, and geographic unit, West Virginia 1975.
16. Primary reason for owning commercial forest land, by number of owners who have not harvested timber, acreage owned, and geographic unit, West Virginia 1975.
17. Primary reason for owning commercial forest land, by intention to harvest for all owners and the number of acres they own, West Virginia 1975.
18. Primary benefit in the last 5 years from ownership of commercial forest land and primary benefit expected in the next 5 years, by number of owners who have and number who have not harvested timber, and the number of acres they own, West Virginia 1975.
19. Primary benefit in the last 5 years from ownership of commercial forest land and primary benefit expected in the next 5 years, by number of owners who have and number who have not harvested timber, and the number of acres they own, Northeastern Unit, West Virginia 1975.
20. Primary benefit in the last 5 years from ownership of commercial forest land and primary benefit expected in the next 5 years, by number of owners who have and number who have not harvested timber, and the number of acres they own, Southern Unit, West Virginia 1975.
21. Primary benefit in the last 5 years from ownership of commercial forest land and primary benefit expected in the next 5 years, by number of owners who have and number who have not harvested timber, and the number of acres

they own, Northwestern Unit, West Virginia 1975.
22. Primary benefit expected in the next 5 years from ownership of commercial forest land, by intention to harvest for all owners and the number of acres they own, West Virginia 1975
23. Reason for harvesting, by ownership group, number of owners, and acres of commercial forest land owned, West Virginia 1975.
24. Estimated number of private owners of commercial forest land and acres owned, by reason for harvesting and geographic unit, West Virginia 1975.
25. Reason for not harvesting, by ownership group, number of owners, and acres of commercial forest land owned, West Virginia 1975.
26. Estimated number of private owners of commercial forest land and acres owned, by reason for not harvesting and geographic unit, West Virginia 1975.
27. Expected time of timber harvest, by number of owners and acreage owned, West Virginia 1975.
28. Expected time of timber harvest, by number of owners and acreage owned, Northeastern Unit, West Virginia 1975.
29. Expected time of timber harvest, by number of owners and acreage owned, Southern Unit, West Virginia 1975.
30. Expected time of timber harvest, by number of owners and acreage owned, Northwestern Unit, West Virginia 1975.
31. Estimated number of private owners of commercial forest land and the acreage they own, by size class of ownership and expected time of timber harvest, West Virginia 1975.
32. Estimated number of owners harvesting timber and acres owned, by individual selecting timber and method of selection, West Virginia 1975.
33. Estimated number of owners harvesting timber and acres owned, by individual selecting timber and method of selection, Northeastern Unit, West Virginia 1975.
34. Estimated number of owners harvesting timber and acres owned, by individual selecting timber and method of selection, Southern Unit, West Virginia 1975.
35. Estimated number of owners harvesting timber and acres owned, by individual selecting timber and method of selection, Northwestern Unit, West Virginia 1975.
36. Estimated number of private owners of commercial forest land and acres owned, by individual selecting timber and method of selection, West Virginia 1975.
37. Estimated number of private owners of commercial forest land and acres owned, by product harvested and geographic unit, West Virginia 1975.
38. Estimated number of private owners of commercial forest land and acres owned, by agency that owners would contact for forestry assistance, West Virginia 1975.
39. Estimated number of private owners of commercial forest land and acres owned, by owners who have received forestry assistance, and nature of service, West Virginia 1975.
40. Estimated number of private owners allowing and not permitting public use of their land, by geographic unit, West Virginia 1975.
41. Estimated number of private owners of commercial forest land and acres owned, by public use permitted and geographic unit, West Virginia 1975.
42. Estimated number of private owners of commercial forest land and acres owned, by reason for posting land and geographic unit, West Virginia 1975.
43. Estimated number of private owners of commercial forest land and the acreage they own, by organization membership, West Virginia 1975.
44. Estimated number of individual owners of commercial forest land and the acreage they own, by publications they receive, West Virginia 1975.
45. Number of responses to true-false statements, by individual owners of

commercial forest land and the acreage they own, West Virginia 1975.

46. Estimated number of individual owners of commercial forest land and the acreage they own, by percent score for 10 true-false statements, West Virginia 1975.

Table 1.—Estimated number of private owners of commercial forest land and acres owned, by size class of ownership and geographic unit, West Virginia 1975

Size class (acres)	Northeastern		Southern		Northwestern		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
1-9	34,900	48	25,900	45	22,100	29	82,900	40
10-19	11,300	15	10,000	17	18,500	24	39,800	19
20-49	12,700	17	10,500	18	17,600	23	40,800	20
50-99	5,900	8	6,100	11	12,600	17	24,600	12
100-199	5,300	7	3,300	6	4,700	6	13,300	7
200-499	2,600	4	1,000	2	1,100	1	4,700	2
500-999	400	1	300	1	200	**	900	**
1,000+	300	**	100	**	100	**	500	**
Total	73,400	100	57,200	100	76,900	100	207,500	100
				ACRES OWNED				
1-9	88,700	2	70,700	2	97,600	3	257,000	2
10-19	149,300	4	127,600	3	223,400	7	500,300	5
20-49	375,400	11	317,200	9	534,800	17	1,227,400	12
50-99	392,400	11	387,900	10	873,700	29	1,654,000	16
100-199	663,700	19	398,400	11	595,400	19	1,657,500	16
200-499	730,200	20	286,200	8	331,600	11	1,348,000	13
500-999	237,100	7	207,000	6	126,800	4	570,900	6
1,000+	932,300	26	1,897,600	51	297,900	10	3,127,800	30
Total	3,569,100	100	3,692,600	100	3,081,200	100	10,342,900	100

**Less then 0.5 percent.

Table 2.—Estimated number of private owners of commercial forest land and acres owned, by form of ownership and geographic unit, West Virginia 1975

Form of ownership	Owners		Commercial forest land owned		Owners who have harvested	Acres owned by harvesters
	Number	*Percent*	*Acres*	*Percent*	*Percent*	*Percent*
			NORTHEASTERN			
Individual	60,800	83	2,420,000	68	37	56
Corporation	2,500	3	645,800	18	12	86
Partnership	3,200	4	98,100	3	16	62
Other	6,900	10	405,200	11	32	58
Total	73,400	100	3,569,100	100	34	62
			SOUTHERN			
Individual	54,700	96	1,625,900	44	17	48
Corporation	400	1	1,731,800	47	25	97
Partnership	200	**	71,100	2	**	61
Other	1,900	3	263,800	7	53	68
Total	57,200	100	3,692,600	100	18	72
			NORTHWESTERN			
Individual	66,600	87	2,471,600	80	37	41
Corporation	100	**	213,400	7	100	89
Partnership	900	1	121,100	4	33	69
Other	9,300	12	275,100	9	34	54
Total	76,900	100	3,081,200	100	37	47
			TOTAL			
Individual	182,100	88	6,517,500	63	31	48
Corporation	3,000	1	2,591,000	25	17	93
Partnership	4,300	2	290,300	3	19	64
Other	18,100	9	944,100	9	35	60
Total	207,500	100	10,342,900	100	31	61

**Less than 0.5 percent.

Table 3.—Estimated number of corporate owners of commercial forest land and acres owned, by nature of business, West Virginia 1975

Nature of business	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
Real estate	600	20	520,800	20
Forest industry	*	**	816,500	32
Other industry	2,300	77	963,900	37
Public utility	*	**	157,900	6
Other	100	3	131,900	5
Total	3,000	100	2,591,000	100

* Fewer than 50 owners.
** Less than 0.5 percent.

Table 4.—Estimated number of individual owners of commercial forest land and acres owned, by occupation and geographic unit, West Virginia 1975

Occupation	Northeastern		Southern		Northwestern		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
					OWNERS			
Professional	2,000	3	1,000	2	1,600	2	4,600	3
Executive	1,500	2	1,000	2	1,900	3	4,400	2
Retired	7,400	12	25,200	46	13,100	20	45,700	25
White collar	800	1	1,400	3	1,500	2	3,700	2
Skilled labor	1,500	2	3,200	6	6,900	11	11,600	6
Housewife	1,600	3	500	1	1,400	2	3,500	2
Laborer	17,300	29	3,600	6	24,800	37	45,700	25
Farmer	16,100	27	2,600	5	9,800	15	28,500	16
Other	4,300	7	5,800	10	1,600	2	11,700	6
No answer	8,300	14	10,400	19	4,000	6	22,700	13
Total	60,800	100	54,700	100	66,600	100	182,100	100
					ACRES OWNED			
Professional	242,300	10	144,900	9	140,700	6	527,900	8
Executive	266,900	11	143,000	9	134,700	5	544,600	8
Retired	372,700	15	374,100	23	621,600	25	1,368,400	21
White collar	113,400	5	100,000	6	99,700	4	313,100	5
Skilled labor	88,800	4	129,300	8	136,100	6	354,200	5
Housewife	133,100	6	46,600	3	74,500	3	254,200	4
Laborer	305,400	12	186,100	11	537,100	22	1,028,600	16
Farmer	690,900	28	225,900	14	484,400	19	1,401,200	22
Other	93,900	4	131,100	8	88,400	4	313,400	5
No answer	112,600	5	144,900	9	154,400	6	411,900	6
Total	2,420,000	100	1,625,900	100	2,471,600	100	6,517,500	100

Table 5.—Age class of individual owners, by number of owners and acres of commercial forest land owned, and geographic unit, West Virginia 1975

Age class (years)	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
		NORTHEASTERN		
Under 25	—	—	—	—
25 to 44	19,600	32	393,300	16
45 to 64	28,000	46	1,242,800	51
65 and over	12,800	21	721,600	30
No answer	400	1	62,300	3
Total	60,800	100	2,420,000	100
		SOUTHERN		
Under 25	—	—	—	—
25 to 44	8,100	15	274,200	17
45 to 64	28,000	51	784,400	48
65 and over	8,900	16	408,600	25
No answer	9,700	18	158,700	10
Total	54,700	100	1,625,900	100
		NORTHWESTERN		
Under 25	600	1	48,900	2
25 to 44	17,700	27	562,500	23
45 to 64	24,900	37	904,300	36
65 and over	20,600	31	814,500	33
No answer	2,800	4	141,400	6
Total	66,600	100	2,471,600	100
		TOTAL		
Under 25	600	**	48,900	1
25 to 44	45,400	25	1,230,000	19
45 to 64	80,900	45	2,931,500	45
65 and over	42,300	23	1,944,700	30
No answer	12,900	7	362,400	5
Total	182,100	100	6,517,500	100

** Less than 0.5 percent.

Table 6.—Years of formal education of individual owners, by number of owners, acres of commercial forest land owned, and geographic unit, West Virginia 1975

Education level	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
		NORTHEASTERN		
0 to 8 years	26,400	44	783,900	33
9 to 12 years	22,700	37	662,800	27
Beyond high school	7,200	12	431,600	18
Bachelor degree	1,400	2	123,700	5
Graduate education	1,800	3	294,300	12
No answer	1,300	2	123,700	5
Total	60,800	100	2,420,000	100
		SOUTHERN		
0 to 8 years	25,500	47	500,000	31
9 to 12 years	8,400	15	403,600	25
Beyond high school	4,500	8	275,700	17
Bachelor degree	900	2	103,400	6
Graduate education	2,900	5	186,200	11
No answer	12,500	23	157,000	10
Total	54,700	100	1,625,900	100
		NORTHWESTERN		
0 to 8 years	26,500	40	873,400	36
9 to 12 years	20,100	30	601,600	24
Beyond high school	10,300	15	365,100	15
Bachelor degree	1,300	2	175,900	7
Graduate education	2,000	3	201,800	8
No answer	6,400	10	253,800	10
Total	66,600	100	2,471,600	100
		TOTAL		
0 to 8 years	78,400	43	2,157,300	33
9 to 12 years	51,200	28	1,668,000	26
Beyond high school	22,000	12	1,072,400	17
Bachelor degree	3,600	2	403,000	6
Graduate education	6,700	4	682,300	10
No answer	20,200	11	534,500	8
Total	182,100	100	6,517,500	100

Table 7.—Individual owners by income group, number of owners, acres of commercial forest land owned, and geographic unit, West Virginia 1975

Annual income	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
		NORTHEASTERN		
Less than $10,000	37,400	62	1,263,300	52
$10,000-$14,999	16,600	27	276,400	12
$15,000-$19,999	1,800	3	202,200	8
$20,000-$29,999	500	1	153,500	6
$30,000 or more	2,400	4	296.000	12
No answer	2,100	3	228,600	10
Total	60,800	100	2,420,000	100
		SOUTHERN		
Less than $10,000	33,000	60	772,500	48
$10,000-$14,999	4,700	9	260,300	16
$15,000-$19,999	1,200	2	127,600	8
$20,000-$29,999	1,700	3	72,400	4
$30,000 or more	200	**	89,500	5
No answer	13,900	26	303,600	19
Total	54,700	100	1,625,900	100
		NORTHWESTERN		
Less than $10,000	32,200	48	1,275,100	52
$10,000-$14,999	17,800	27	391,200	16
$15,000-$19,999	5,900	9	139,000	6
$20,000-$29,999	900	1	109,500	4
$30,000 or more	1,800	3	178,100	7
No answer	8,000	12	378,700	15
Total	66,600	100	2,471,600	100
		TOTAL		
Less than $10,000	102,600	56	3,310,900	51
$10,000-$14,999	39,100	22	927,900	14
$15,000-$19,999	8,900	5	468,800	7
$20,000-$29,999	3,100	2	335,400	5
$30,000 or more	4,400	2	563,600	9
No answer	24,000	13	910,900	14
Total	182,100	100	6,517,500	100

** Less than 0.5 percent.

Table 8.—Early life environment of individual owners, by number of owners, acres of commercial forest land owned, and geographic unit, West Virginia 1975

Type of environment[a]	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
		NORTHEASTERN		
City over 10,000	12,400	20	218,400	9
Town under 10,000	3,900	6	278,100	11
Rural area	13,700	23	378,700	16
Farm	26,700	44	1,410,900	58
No answer	4,100	7	133,900	6
Total	60,800	100	2,420,000	100
		SOUTHERN		
City over 10,000	3,900	7	282,700	17
Town over 10,000	800	1	129,300	8
Rural area	17,300	32	319.000	20
Farm	21,300	39	708,700	44
No answer	11,400	21	186,200	11
Total	54,700	100	1,625,900	100
		NORTHWESTERN		
City over 10,000	2,800	4	179,000	7
Town under 10,000	5,500	8	259,300	10
Rural area	23,100	35	544,900	22
Farm	30,100	45	1,298,100	53
No answer	5,100	8	190,300	8
Total	66,600	100	2,471,600	100
		TOTAL		
City over 10,000	19,100	10	680,100	10
Town under 10,000	10,200	6	666,700	10
Rural area	54,100	30	1,242,600	19
Farm	78,100	43	3,417,700	53
No answer	20,600	11	510,400	8
Total	182,100	100	6,517,500	100

[a] First 12 years of life.

Table 9—Estimated number of owners of commercial forest land and acres owned, by period of ownership and geographic unit, West Virginia 1975

Period of ownership (years)	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
		NORTHEASTERN		
Less than 5	10,800	15	387,400	11
5-9	13,700	19	325,300	9
10-24	31,200	42	1,169,900	33
25-49	8,500	11	976,600	27
More than 50	1,200	2	451,300	13
No answer	8,000	11	258,600	7
Total	73,400	100	3,569,100	100
		SOUTHERN		
Less than 5	7,300	13	387,900	10
5-9	8,600	15	321,200	9
10-24	23,200	40	793,500	21
25-49	6,200	11	499,500	14
More than 50	1,300	2	1,214,000	33
No answer	10,600	19	476,500	13
Total	57,200	100	3,692,600	100
		NORTHWESTERN		
Less than 5	14,200	19	404,800	13
5-9	14,800	19	512,200	17
10-24	22,500	29	872,600	28
25-49	18,700	25	919,400	30
More than 50	1,800	2	158,100	5
No answer	4,900	6	214,100	7
Total	76,900	100	3,081,200	100
		TOTAL		
Less than 5	32,300	16	1,180,100	12
5-9	37,100	18	1,158,700	11
10-24	76,900	37	2,836,000	27
25-49	33,400	16	2,395,500	23
More than 50	4,300	2	1,823,400	18
No answer	23,500	11	949,200	9
Total	207,500	100	10,342,900	100

Table 10.—Estimated number of individual owners and acreage owned, by period of ownership and geographic unit, West Virginia 1975

Period of ownership (years)	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
		NORTHEASTERN		
Less than 5	5,300	9	300,300	12
5-9	11,600	19	228,600	9
10-24	30,300	50	914,300	38
25-49	7,400	12	676,500	28
More than 50	900	1	116,900	5
No answer	5,300	9	183,400	8
Total	60,800	100	2,420,000	100
		SOUTHERN		
Less than 5	6,900	13	329,300	20
5-9	8,100	15	250,100	16
10-24	22,400	41	391,500	24
25-49	5,700	10	394,600	24
More than 50	1,200	2	101,700	6
No answer	10,400	19	158,700	10
Total	54,700	100	1,625,900	100
		NORTHWESTERN		
Less than 5	10,300	15	381,300	15
5-9	13,200	20	422,500	17
10-24	20,400	31	607,800	25
25-49	17,600	26	768,800	31
More than 50	1,300	2	112,400	5
No answer	3,800	6	178,800	7
Total	66,600	100	2,471,600	100
		TOTAL		
Less than 5	22,500	12	1,010,900	16
5-9	32,900	18	901,200	14
10-24	73,100	40	1,913,600	29
25-49	30,700	17	1,839,900	28
More than 50	3,400	2	331,000	5
No answer	19,500	11	520,900	8
Total	182,100	100	6,517,500	100

Table 11.—Estimated number of owners of commercial forest land and acreage owned, by distance from tracts and number of tracts owned, West Virginia 1975

Distance from tract (miles)	Distance from nearest tract		Distance from farthest tract				
			1 tract	2 tracts	3 or more tracts	Total	
	Number	*Percent*	*Number*				*Percent*
			OWNERS				
Residence to 1	126,500	61	101,900	10,100	6,400	118,400	57
2-5	14,600	7	11,200	4,600	3,200	19,000	9
6-15	10,800	5	8,700	3,200	1,000	12,900	6
16-25	1,900	1	1,200	2,400	1,100	4,700	2
26-50	8,600	4	8,500	1,000	600	10,100	5
More than 50	22,300	11	19,500	2,100	1,200	22,800	11
No answer	22,800	11	16,500	2,500	600	19,600	10
Total	207,500	100	167,500	25,900	14,100	207,500	100
			ACRES OWNED				
Residence to 1	4,514,600	44	2,088,600	571,600	443,900	3,104,100	30
2-5	935,800	9	344,000	328,200	498,800	1,171,000	11
6-15	1,362,500	13	349,200	294,900	379,400	1,023,500	10
16-25	348,900	3	178,800	237,000	456,700	872,500	9
26-50	504,600	5	200,300	149,500	376,000	725,800	7
More than 50	954,100	9	475,500	204,600	1,623,900	2,304,000	22
No answer	1,722,400	17	579,400	87,800	474,800	1,142,000	11
Total	10,342,900	100	4,215,800	1,873,600	4,253,500	10,342,900	100

Table 12.—Estimated number of owners and acreage owned, by distance from nearest tract and geographic unit, West Virginia 1975

Distance from tract (miles)	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
		NORTHEASTERN		
Residence to 1	37,600	52	1,512,300	42
2-5	8,100	11	485,100	14
6-15	5,200	7	453,000	13
16-25	300	**	63,100	2
26-50	800	1	160,800	4
More than 50	16,300	22	416,300	12
No answer	5,100	7	478,500	13
Total	73,400	100	3,569,100	100
		SOUTHERN		
Residence to 1	40,000	70	1,280,200	35
2-5	2,200	4	253,600	7
6-15	1,800	3	617,800	17
16-25	700	1	197,900	5
26-50	500	1	230,900	6
More than 50	1,600	3	289,400	8
No answer	10,400	18	822,800	22
Total	57,200	100	3,692,600	100
		NORTHWESTERN		
Residence to 1	48,900	64	1,722,100	56
2-5	4,300	6	197,100	6
6-15	3,800	5	291,700	9
16-25	900	1	87,900	3
26-50	7,300	9	112,900	4
More than 50	4,400	6	248,400	8
No answer	7,300	9	421,100	14
Total	76,900	100	3,081,200	100
		TOTAL		
Residence to 1	126,500	61	4,514,600	44
2-5	14,600	7	935,800	9
6-15	10,800	5	1,362,500	13
16-25	1,900	1	348,900	3
26-50	8,600	4	504,600	5
More than 50	22,300	11	954,100	9
No answer	22,800	11	1,722,400	17
Total	207,500	100	10,342,900	100

** Less than 0.5 percent.

Table 13.—Estimated number of owners and acreage owned, by number of tracts owned and geographic unit, West Virginia 1975

Number of tracts owned	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
		NORTHEASTERN		
1	56,400	77	1,370,900	38
2	11,100	15	713,100	20
3 or more	5,900	8	1,485,100	42
Total	73,400	100	3,569,100	100
		SOUTHERN		
1	47,100	82	1,144,300	31
2	7,000	12	613,700	17
3 or more	3,100	6	1,934,600	52
Total	57,200	100	3,692,600	100
		NORTHWESTERN		
1	64,000	83	1,700,600	55
2	7,800	10	546,800	18
3 or more	5,100	7	833,800	27
Total	76,900	100	3,081,200	100
		TOTAL		
1	167,500	81	4,215,800	41
2	25,900	12	1,873,600	18
3 or more	14,100	7	4,253,500	41
Total	207,500	100	10,342,900	100

Table 14.—Primary reason for owning commercial forest land, by number of owners, and acreage owned, and geographic unit, West Virginia 1975

Reason	Northeastern		Southern		Northwestern		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
Land investment	8,700	12	3,300	6	9,200	12	21,200	10
Recreation	15,600	21	1,100	2	4,700	6	21,400	10
Timber production	3,700	5	700	1	1,100	1	5,500	3
Farm and domestic use	6,600	9	5,000	9	22,400	29	34,000	16
Esthetic enjoyment	7,000	9	12,700	22	4,300	6	24,000	12
Part of farm	7,900	11	12,700	22	9,500	12	30,100	14
Part of residence	20,800	28	9,300	16	17,300	23	47,400	23
Other	1,200	2	900	2	3,500	5	5,600	3
No answer	1,900	3	11,500	20	4,900	6	18,300	9
Total	73,400	100	57,200	100	76,900	100	207,500	100
				ACRES OWNED				
Land investment	452,200	13	364,300	10	229,400	7	1,045,900	10
Recreation	522,100	15	225,900	6	220,200	7	968,200	9
Timber production	483,400	14	1,186,400	32	340,100	11	2,009,900	19
Farm and domestic use	506,600	14	224,200	6	655,200	21	1,386,000	13
Esthetic enjoyment	325,800	9	286,200	8	300,100	10	912,100	9
Part of farm	468,300	13	355,300	10	475,900	15	1,299,500	13
Part of residence	286,600	8	193,000	5	511,900	17	991,500	10
Other	410,600	11	729,700	20	201,700	7	1,342,000	13
No answer	113,500	3	127,600	3	146,700	5	387,800	4
Total	3,569,100	100	3,692,600	100	3,081,200	100	10,342,900	100

Table 15.—Primary reason for owning commercial forest land, by number of owners who have harvested timber, acreage owned, and geographic unit, West Virginia 1975

Reason	Northeastern		Southern		Northwestern		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
Land investment	4,200	17	800	8	6,600	24	11,600	18
Recreation	1,300	5	200	2	2,200	8	3,700	6
Timber production	800	3	400	4	800	3	2,000	3
Farm and domestic use	3,900	16	2,100	20	11,900	42	17,900	28
Esthetic enjoyment	2,400	10	2,200	21	400	1	5,000	8
Part of farm	3,100	12	2,100	20	1,500	5	6,700	11
Part of residence	8,600	34	1,200	12	3,100	11	12,900	20
Other	600	2	500	5	300	1	1,400	2
No answer	300	1	800	8	1,300	5	2,400	4
Total	25,200	100	10,300	100	28,100	100	63,600	100
				ACRES OWNED				
Land investment	332,800	15	185,000	7	154,100	11	671,900	11
Recreation	276,400	12	84,500	3	72,800	5	433,700	7
Timber production	407,500	18	1,170,800	44	300,100	21	1,878,400	30
Farm and domestic use	361,600	16	127,600	5	372,500	26	861,700	14
Esthetic enjoyment	130,400	6	129,300	5	74,100	5	333,800	5
Part of farm	233,700	11	213,800	8	152,500	11	600,000	9
Part of residence	123,700	6	46,500	2	208,700	14	378,900	6
Other	309,100	14	655,600	24	44,000	3	1,008,700	16
No answer	37,500	2	55,200	2	59,700	4	152,400	2
Total	2,212,700	100	2,668,300	100	1,438,500	100	6,319,500	100

Table 16.—Primary reason for owning commercial forest land, by number of owners who have not harvested timber, acreage owned, and geographic unit, West Virginia 1975

Reason	Northeastern		Southern		Northwestern		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
Land investment	4,500	9	2,500	5	2,600	5	9,600	7
Recreation	14,300	30	900	2	2,500	5	17,700	12
Timber production	2,900	6	300	1	300	1	3,500	3
Farm and domestic use	2,700	6	2,900	6	10,500	22	16,100	11
Esthetic enjoyment	4,600	10	10,500	22	3,900	8	19,000	13
Part of farm	4,800	10	10,600	23	8,000	16	23,400	16
Part of residence	12,200	25	8,100	17	14,200	29	34,500	24
Other	600	1	400	1	3,200	7	4,200	3
No answer	1,600	3	10,700	23	3,600	7	15,900	11
Total	48,200	100	46,900	100	48,800	100	143,900	100
				ACRES OWNED				
Land investment	119,400	9	179,300	18	75,300	5	374,000	9
Recreation	245,700	18	141,400	14	147,400	9	534,500	13
Timber production	75,900	6	15,600	2	40,000	2	131,500	3
Farm and domestic use	145,000	11	96,600	9	282,700	17	524,300	13
Esthetic enjoyment	195,400	14	156,900	15	226,000	14	578,300	15
Part of farm	234,600	17	141,500	14	323,400	20	699,500	18
Part of residence	162,900	12	146,500	14	303,200	18	612,600	15
Other	101,500	7	74,100	7	157,700	10	333,300	8
No answer	76,000	6	72,400	7	87,000	5	235,400	6
Total	1,356,400	100	1,024,300	100	1,642,700	100	4,023,400	100

Table 17.—Primary reason for owning commercial land, by intention to harvest for all owners and the number of acres they own, West Virginia 1975

Reason	1 to 10 years		Indefinite		Will never harvest		No answer		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
					OWNERS					
Land investment	1,500	1	8,900	4	4,600	2	6,200	3	21,200	10
Recreation	1,000	**	4,600	3	14,700	7	1,100	**	21,400	10
Timber production	3,100	2	2,300	1	100	**	*	**	5,500	3
Farm and domestic use	3,400	2	18,400	8	10,200	5	2,000	1	34,000	16
Esthetic enjoyment	1,300	1	7,600	4	15,100	7	*	**	24,000	12
Part of farm	4,300	2	12,900	6	11,500	5	1,400	1	30,100	14
Part of residence	1,100	**	23,000	12	22,200	11	1,100	**	47,400	23
Other	300	**	2,000	1	3,000	2	300	**	5,600	3
No answer	100	**	1,000	**	14,200	7	3,000	2	18,300	9
Total	16,100	8	80,700	39	95,600	46	15,100	7	207,500	100
					ACRES OWNED					
Land investment	362,500	3	497,800	5	159,700	2	25,900	**	1,045,900	10
Recreation	207,800	2	476,000	5	260,500	2	23,900	**	968,200	9
Timber production	1,698,400	16	201,500	2	29,400	**	80,600	1	2,009,900	19
Farm and domestic use	235,100	2	799,200	7	287,200	3	64,500	1	1,386,000	13
Esthetic enjoyment	107,600	2	466,300	4	314,300	3	23,900	**	912,100	9
Part of farm	183,300	2	761,000	7	302,800	3	52,400	1	1,299,500	13
Part of residence	118,600	2	533,400	5	313,600	3	25,900	**	991,500	10
Other	733,700	7	477,600	5	105,300	1	25,400	**	1,342,000	13
No answer	27,300	**	61,700	1	219,700	2	79,100	1	387,800	4
Total	3,674,300	36	4,274,500	41	1,992,500	19	401,600	4	10,342,900	100

* Fewer than 50 acres.

** Less than 0.5 percent.

Table 18.—Primary benefit in the last 5 years from ownership of commercial forest land and primar benefit expected in the next 5 years, by number of owners who have and number who have not ha vested timber, and the number of acres they own, West Virginia 1975

Benefit	Last 5 years				Next 5 years			
	Owners		Commercial forest land owned		Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*	*Number*	*Percent*	*Acres*	*Percent*
				OWNERS WHO HARVESTED				
Recreation	4,600	2	543,100	5	3,500	2	551,600	5
Sale of timber	5,300	3	1,801,000	18	2,700	1	1,596,900	16
Land value increase	20,700	10	1,259,300	12	23,600	11	1,390,600	13
Esthetic enjoyment	10,400	5	696,900	7	10,900	5	669,300	6
Farm and domestic use	19,100	9	906,600	9	18,100	9	812,300	8
Other	1,300	1	965,800	9	1,200	1	1,077,600	11
No answer	2,200	1	146,800	1	3,600	2	221,200	2
Total	63,600	31	6,319,500	61	63,600	31	6,319,500	61
				OWNERS WHO HAVE NOT HARVESTED				
Recreation	21,000	10	549,600	6	18,800	9	485,500	5
Sale of timber	—	—	—	—	3,000	1	129,600	1
Land value increase	24,400	12	853,700	8	27,000	13	1,002,700	10
Esthetic enjoyment	51,300	25	1,285,000	12	46,800	23	1,093,500	11
Farm and domestic use	20,800	10	722,800	7	22,600	11	750,900	7
Other	7,500	3	222,600	2	6,500	3	149,300	1
No answer	18,900	9	389,700	4	19,200	9	411,900	4
Total	143,900	69	4,023,400	39	143,900	69	4,023,400	39
				ALL OWNERS				
Recreation	25,600	12	1,092,700	11	22,300	11	1,037,100	10
Sale of timber	5,300	3	1,801,000	18	5,700	2	1,726,500	17
Land value increase	45,100	22	2,113,000	20	50,600	24	2,393,300	23
Esthetic enjoyment	61,700	30	1,981,900	19	57,700	28	1,762,800	17
Farm and domestic use	39,900	19	1,629,400	16	40,700	20	1,563,200	15
Other	8,800	4	1,188,400	11	7,700	4	1,226,900	12
No answer	21,100	10	536,500	5	22,800	11	633,100	6
Total	207,500	100	10,342,900	100	207,500	100	10,342,900	100

Table 19.—Primary benefit in the last 5 years from ownership of commercial forest land and primary benefit expected in the next 5 years, by number of owners who have and number who have not harvested timber, and number of acres they own, Northeastern Unit, West Virginia 1975

Benefit	Last 5 years				Next 5 years			
	Owners		Commercial forest land owned		Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*	*Number*	*Percent*	*Acres*	*Percent*
				OWNERS WHO HARVESTED				
Recreation	2,000	3	342,900	10	2,200	3	362,600	10
Sale of timber	1,700	2	434,300	12	600	1	348,000	10
Land value increase	11,500	16	644,700	18	12,100	16	610,800	17
Esthetic enjoyment	5,300	7	325,900	9	5,800	8	307,900	9
Farm and domestic use	4,200	6	287,500	8	3,800	5	286,600	8
Other	200	**	152,700	4	100	**	218,300	6
No answer	300	**	24,700	1	600	1	78,500	2
Total	25,200	34	2,212,700	62	25,200	34	2,212,700	62
				OWNERS WHO HAVE NOT HARVESTED				
Recreation	13,700	19	244,900	7	13,900	19	206,400	6
Sale of timber	—	—	—	—	1,500	2	37,500	1
Land value increase	13,300	18	308,000	9	13,600	19	346,300	10
Esthetic enjoyment	11,100	15	394,900	11	8,900	12	359,200	10
Farm and domestic use	6,300	9	232,900	6	6,300	9	232,100	6
Other	1,000	1	26,400	1	1,200	1	52,100	2
No answer	2,800	4	149,300	4	2,800	4	122,800	3
Total	48,200	66	1,356,400	38	48,200	66	1,356,400	38
				ALL OWNERS				
Recreation	15,700	22	587,800	17	16,100	22	569,000	16
Sale of timber	1,700	2	434,300	12	2,100	3	385,500	11
Land value increase	24,800	34	952,700	27	25,700	35	957,100	27
Esthetic enjoyment	16,400	22	720,800	20	14,700	20	667,100	19
Farm and domestic use	10,500	15	520,400	14	10,100	14	518,700	14
Other	1,200	1	179,100	5	1,300	1	270,400	8
No answer	3,100	4	174,000	5	3,400	5	201,300	5
Total	73,400	100	3,569,100	100	73,400	100	3,569,100	100

** Less than 0.5 percent.

Table 20.—Primary benefit in the last 5 years from ownership of commercial forest land and primary benefit expected in the next 5 years, by number of owners who have and number who have not harvested timber, and the number of acres they own, Southern Unit, West Virginia 1975

Benefit	Last 5 years				Next 5 years			
	Owners		Commercial forest land owned		Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*	*Number*	*Percent*	*Acres*	*Percent*
				OWNERS WHO HARVESTED				
Recreation	900	2	98,300	2	500	1	113,800	3
Sale of timber	1,700	3	1,051,800	29	900	2	1,005,900	27
Land value increase	600	1	326,500	9	2,000	3	413,800	11
Esthetic enjoyment	3,000	5	260,300	7	2,500	4	201,800	5
Farm and domestic use	2,700	4	184,500	5	2,700	4	156,800	4
Other	800	2	672,700	18	800	2	719,300	20
No answer	600	1	74,200	2	900	2	56,900	2
Total	10,300	18	2,668,300	72	10,300	18	2,668,300	72
				OWNERS WHO HAVE NOT HARVESTED				
Recreation	1,900	3	101,700	3	800	2	100,000	3
Sale of timber	—	—	—	—	300	**	29,300	1
Land value increase	5,600	10	275,800	7	6,000	10	322,400	9
Esthetic enjoyment	23,300	41	357,100	10	23,900	42	325,900	9
Farm and domestic use	3,700	7	129,300	4	5,400	10	158,700	4
Other	100	**	44,900	1	—	—	—	—
No answer	12,300	21	115,500	3	10,500	18	88,000	2
Total	46,900	82	1,024,300	28	46,900	82	1,024,300	28
				ALL OWNERS				
Recreation	2,800	5	200,000	5	1,300	3	213,800	6
Sale of timber	1,700	3	1,051,800	29	1,200	2	1,035,200	28
Land value increase	6,200	11	602,300	16	8,000	13	736,200	20
Esthetic enjoyment	26,300	46	617,400	17	26,400	46	527,700	14
Farm and domestic use	6,400	11	313,800	9	8,100	14	315,500	8
Other	900	2	717,600	19	800	2	719,300	20
No answer	12,900	22	189,700	5	11,400	20	144,900	4
Total	57,200	100	3,692,600	100	57,200	100	3,692,600	100

** Less than 0.5 percent.

Table 21.—Primary benefit in the last 5 years from ownership of commercial forest land and primary benefit expected in the next 5 years, by number of owners who have and number who have not harvested timber, and the number of acres they own, Northwestern Unit, West Virginia 1975

Benefit	Last 5 years				Next 5 years			
	Owners		Commercial forest land owned		Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*	*Number*	*Percent*	*Acres*	*Percent*
				OWNERS WHO HARVESTED				
Recreation	1,700	2	101,900	3	800	1	75,200	2
Sale of timber	1,900	3	314,900	10	1,200	2	243,000	8
Land value increase	8,600	11	288,100	9	9,500	13	366,000	12
Esthetic enjoyment	2,100	3	110,700	4	2,600	3	159,600	5
Farm and domestic use	12,200	16	434,600	14	11,600	15	368,900	12
Other	300	**	140,400	5	300	**	140,000	5
No answer	1,300	2	47,900	2	2,100	3	85,800	3
Total	28,100	37	1,438,500	47	28,100	37	1,438,500	47
				OWNERS WHO HAVE NOT HARVESTED				
Recreation	5,400	7	203,000	6	4,100	5	179,100	6
Sale of timber	—	—	—	—	1,200	2	62,800	2
Land value increase	5,500	7	269,900	9	7,400	9	334,000	11
Esthetic enjoyment	16,900	22	533,000	17	14,000	18	408,400	13
Farm and domestic use	10,800	14	360,600	12	10,900	14	360,100	12
Other	6,400	8	151,300	5	5,300	7	97,200	3
No answer	3,800	5	124,900	4	5,900	8	201,100	6
Total	48,800	63	1,642,700	53	48,800	63	1,642,700	53
				ALL OWNERS				
Recreation	7,100	9	304,900	9	4,900	6	254,300	8
Sale of timber	1,900	3	314,900	10	2,400	4	305,800	10
Land value increase	14,100	18	558,000	18	16,900	22	700,000	23
Esthetic enjoyment	19,000	25	643,700	21	16,600	21	568,000	18
Farm and domestic use	23,000	30	795,200	26	22,500	29	729,000	24
Other	6,700	8	291,700	10	5,600	7	237,200	8
No answer	5,100	7	172,800	6	8,000	11	286,900	9
Total	76,900	100	3,081,200	100	76,900	100	3,081,200	100

** Less than 0.5 percent.

Table 22.—Primary benefit expected in the next 5 years from ownership of commercial forest land, by intention to harvest for all owners and the number of acres they own, West Virginia 1975

Benefit	1 to 10 years		Indefinite		Will never harvest		No answer		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
					OWNERS					
Recreation	1,600	1	5,600	3	15,000	7	100	**	22,300	11
Sale of timber	4,100	1	1,600	1	—	—	*	**	5,700	2
Land value increase	2,300	1	27,700	13	13,800	6	6,800	4	50,600	24
Esthetic enjoyment	1,700	1	21,700	10	32,200	16	2,100	1	57,700	28
Farm and domestic use	5,800	4	19,300	9	13,600	6	2,000	1	40,700	20
Other	100	**	1,500	1	5,200	3	900	**	7,700	4
No answer	500	**	3,300	2	15,800	8	3,200	1	22,800	11
Total	16,100	8	80,700	39	95,600	46	15,100	7	207,500	100
					ACRES OWNED					
Recreation	211,600	2	513,400	5	275,500	3	36,600	**	1,037,100	10
Sale of timber	1,452,800	15	219,700	2	—	—	54,000	**	1,726,500	17
Land value increase	634,800	6	1,425,200	13	278,000	3	55,300	1	2,393,300	23
Esthetic enjoyment	148,200	1	894,300	9	648,500	6	71,800	1	1,762,800	17
Farm and domestic use	256,600	2	821,000	9	422,000	3	63,600	1	1,563,200	15
Other	915,500	9	210,500	2	87,200	1	13,700	**	1,226,900	12
No answer	54,800	1	190,400	1	281,300	3	106,600	1	633,100	6
Total	3,674,300	36	4,274,500	41	1,992,500	19	401,600	4	10,342,900	100

* Fewer than 50 owners.
** Less than 0.5 percent.

Table 23.—Reason for harvesting, by ownership group, number of owners, and acres of commercial forest land owned, West Virginia 1975

Reason	Individual[a]		Corporation		Other[b]		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
					OWNERS			
Timber mature	9,300	17	200	40	1,400	19	10,900	17
Good price	3,500	6	*	**	1,100	15	4,600	7
Land clearing	4,000	7	*	**	—	—	4,000	6
Need of money	24,200	43	200	40	1,600	22	26,000	41
Timber salvage	1,800	3	100	20	900	13	2,800	5
Own or company use	10,600	19	*	**	900	13	11,500	18
Cultural treatment	—	—	—	—	*	**	*	**
No answer	2,500	5	*	**	1,300	18	3,800	6
Total	55,900	100	500	100	7,200	100	63,600	100
					ACRES OWNED			
Timber mature	787,400	25	885,900	37	331,800	44	2,005,100	32
Good price	501,800	16	45,000	2	75,800	10	622,600	10
Land clearing	201,600	6	84,900	3	—	—	286,500	4
Need of money	811,400	26	37,700	1	129,500	17	978,600	15
Timber salvage	263,300	8	386,300	16	108,000	14	757,600	12
Own or company use	466,200	15	962,500	40	63,200	9	1,491,900	24
Cultural treatment	—	—	—	—	15,500	2	15,500	**
No answer	117,900	4	15,500	1	28,300	4	161,700	3
Total	3,149,600	100	2,417,800	100	752,100	100	6,319,500	100

* Fewer than 50 owners.
** Less than 0.5 percent.
[a] Includes joint ownerships.
[b] Includes partnerships, undivided estates, clubs, associations, etc.

Table 24.—Estimated number of private owners of commercial forest land and acres owned, by reason for harvesting and geographic unit, West Virginia 1975

Reason	Northeastern		Southern		Northwestern		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
Timber mature	7,500	30	800	8	2,600	9	10,900	17
Good price	1,700	7	300	3	2,600	9	4,600	7
Land clearing	1,400	6	600	6	2,000	7	4,000	6
Need of money	9,500	37	5,800	56	10,700	38	26,000	41
Timber salvage	500	2	1,100	11	1,200	5	2,800	5
Own or company use	2,900	11	1,300	12	7,300	26	11,500	18
Cultural treatment	—	—	*	**	—	—	*	**
No answer	1,700	7	400	4	1,700	6	3,800	6
Total	25,200	100	10,300	100	28,100	100	63,600	100
				ACRES OWNED				
Timber mature	833,300	38	806,300	30	365,500	26	2,005,100	32
Good price	290,900	13	118,900	4	212,800	15	622,600	10
Land clearing	93,000	4	117,300	4	76,200	5	286,500	4
Need of money	321,500	14	367,300	14	289,800	20	978,600	15
Timber salvage	222,800	10	431,600	16	103,200	7	757,600	12
Own or company use	389,800	18	737,200	28	364,900	25	1,491,900	24
Cultural treatment	—	—	15,500	1	—	—	15,500	**
No answer	61,400	3	74,200	3	26,100	2	161,700	3
Total	2,212,700	100	2,668,300	100	1,438,500	100	6,319,500	100

* Fewer than 50 owners.
** Less than 0.5 percent.

Table 25.—Reason for not harvesting, by ownership group, number of owners, and acres of commercial forest land owned, West Virginia 1975

Reason	Individual[a]		Corporation		Other[b]		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
Timber immature	31,700	25	2,300	92	7,800	51	41,800	29
Low price	3,800	3	—	—	200	1	4,000	3
Destroy hunting	15,700	12	—	—	1,900	13	17,600	12
Selling the land	1,600	1	—	—	—	—	1,600	1
Would destroy the scenery	5,700	5	*	**	600	4	6,300	4
Land in estate	500	**	—	—	1,700	11	2,200	2
Opposed to harvesting	10,800	9	—	—	—	—	10,800	7
Poor quality	9,400	7	*	**	—	—	9,400	7
Low volume	7,900	6	—	—	500	3	8,400	6
Other	28,300	23	*	**	1,900	13	30,200	21
No answer	10,800	9	200	8	600	4	11,600	8
Total	126,200	100	2,500	100	15,200	100	143,900	100
				ACRES OWNED				
Timber immature	898,700	27	66,600	39	115,700	24	1,081,000	27
Low price	208,400	6	—	—	13,800	3	222,200	5
Destroy hunting	355,500	10	—	—	54,200	11	409,700	10
Selling the land	74,200	2	—	—	—	—	74,200	2
Would destroy the scenery	290,100	9	12,800	7	62,700	13	365,600	9
Land in estate	23,900	1	—	—	97,400	20	121,300	3
Opposed to harvesting	146,400	4	—	—	—	—	146,400	4
Poor quality	63,300	2	15,500	9	—	—	78,800	2
Low volume	228,100	7	—	—	12,200	3	240,300	6
Other	783,800	23	25,000	14	74,200	15	883,000	22
No answer	295,500	9	53,300	31	52,100	11	400,900	10
Total	3,367,900	100	173,200	100	482,300	100	4,023,400	100

* Fewer than 50 owners.
** Less than 0.5 percent.
[a] Includes joint ownerships.
[b] Includes partnerships, undivided estates, clubs, associations, etc.

Table 26.—Estimated number of private owners of commercial forest land and acres owned, by reason for not harvesting and geographic unit, West Virginia 1975

Reason	Northeastern		Southern		Northwestern		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
Timber immature	19,400	40	5,000	11	17,400	35	41,800	29
Low price	1,500	3	1,500	3	1,000	2	4,000	3
Destroy hunting	2,200	5	8,500	18	6,900	14	17,600	12
Selling the land	—	—	1,300	3	300	1	1,600	1
Would destroy scenery	1,700	4	1,900	4	2,700	6	6,300	4
Land in estate	1,400	3	*	**	800	2	2,200	2
Opposed to harvesting	600	1	9,000	19	1,200	2	10,800	7
Poor quality	200	**	8,900	19	300	1	9,400	7
Low volume	2,300	5	1,700	4	4,400	9	8,400	6
Other	14,200	29	7,100	15	8,900	18	30,200	21
No answer	4,700	10	2,000	4	4,900	10	11,600	8
Total	48,200	100	46,900	100	48,800	100	143,900	100
				ACRES OWNED				
Timber immature	493,900	37	174,100	17	413,000	25	1,081,000	27
Low price	76,800	6	58,600	6	86,800	5	222,200	5
Destroy hunting	132,300	10	125,900	12	151,500	9	409,700	10
Selling the land	—	—	60,300	6	13,900	1	74,200	2
Would destroy scenery	135,700	10	86,300	8	143,600	9	365.600	9
Land in estate	46,900	3	13,800	1	60,600	4	121,300	3
Opposed to harvesting	12,800	1	56,900	6	76,700	5	146,400	4
Poor quality	23,900	2	43,200	4	11,700	1	78,800	2
Low volume	59,700	4	56,900	6	123,700	7	240,300	6
Other	234,500	17	234,500	23	414,000	25	883,000	22
No answer	139,900	10	113,800	11	147,200	9	400,900	10
Total	1,356,400	100	1,024,300	100	1,642,700	100	4,023,400	100

* Fewer than 50 owners.
** Less than 0.5 percent.

Table 27.—Expected time of timber harvest, by number of owners and acreage owned, West Virginia 1975

Expected time of harvest	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
	OWNERS WHO HARVESTED			
0-5 years	5,100	3	2,935,900	28
5-10 years	1,100	1	203,300	2
Indefinite	38,200	19	2,365,700	23
Will never harvest	9,200	4	529,300	5
No answer	10,000	4	285,300	3
Total	63,600	31	6,319,500	61
	OWNERS WHO HAVE NOT HARVESTED			
0-5 years	6,600	3	349,900	4
5-10 years	3,300	1	185,200	2
Indefinite	42,500	20	1,908,800	18
Will never harvest	86,400	42	1,463,200	14
No answer	5,100	3	116,300	1
Total	143,900	69	4,023,400	39
	ALL OWNERS			
0-5 years	11,700	6	3,285,800	32
5-10 years	4,400	2	388,500	4
Indefinite	80,700	39	4,274,500	41
Will never harvest	95,600	46	1,992,500	19
No answer	15,100	7	401,600	4
Total	207,500	100	10,342,900	100

Table 28.—Expected time of timber harvest, by the number of owners and acreage owned, Northeastern Unit, West Virginia 1975

Expected time of harvest	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
	OWNERS WHO HARVESTED			
0-5 years	2,200	3	858,900	24
5-10 years	600	1	83,600	3
Indefinite	19,400	26	1,005,800	28
Will never harvest	1,600	2	156,100	4
No answer	1,400	2	108,300	3
Total	25,200	34	2,212,700	62
	OWNERS WHO HAVE NOT HARVESTED			
0-5 years	600	1	76,000	2
5-10 years	2,100	3	117,700	3
Indefinite	13,100	18	701,200	20
Will never harvest	31,300	43	410,300	12
No answer	1,100	1	51,200	1
Total	48,200	66	1,356,400	38
	ALL OWNERS			
0-5 years	2,800	4	934,900	26
5-10 years	2,700	4	201,300	6
Indefinite	32,500	44	1,707,000	48
Will never harvest	32,900	45	566,400	16
No answer	2,500	3	159,500	4
Total	73,400	100	3,569,100	100

Table 29.—Expected time of timber harvest, by number of owners and acreage owned, Southern Unit, West Virginia 1975

Expected time of harvest	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
	OWNERS WHO HARVESTED			
0-5 years	1,700	3	1,735,200	46
5-10 years	*	**	46,600	1
Indefinite	5,000	8	655,500	18
Will never harvest	2,700	5	174,100	5
No answer	900	2	56,900	2
Total	10,300	18	2,668,300	72
	OWNERS WHO HAVE NOT HARVESTED			
0-5 years	2,300	4	162,000	5
5-10 years	900	2	43,100	1
Indefinite	10,700	19	432,700	12
Will never harvest	31,000	54	372,700	10
No answer	2,000	3	13,800	**
Total	46,900	82	1,024,300	28
	ALL OWNERS			
0-5 years	4,000	7	1,897,200	51
5-10 years	900	2	89,700	2
Indefinite	15,700	27	1,088,200	30
Will never harvest	33,700	59	546,800	15
No answer	2,900	5	70,700	2
Total	57,200	100	3,692,600	100

* Fewer than 50 owners.
** Less than 0.5 percent.

Table 30.—Expected time of timber harvest, by number of owners and acreage owned, Northwestern Unit, West Virginia 1975

Expected time of harvest	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
	OWNERS WHO HARVESTED			
0-5 years	1,200	2	341,800	11
5-10 years	500	1	73,100	2
Indefinite	13,800	18	704,400	23
Will never harvest	4,900	6	199,100	7
No answer	7,700	10	120,100	4
Total	28,100	37	1,438,500	47
	OWNERS WHO HAVE NOT HARVESTED			
0-5 years	3,700	4	111,900	4
5-10 years	300	**	24,400	1
Indefinite	18,700	24	774,900	25
Will never harvest	24,100	32	680,200	21
No answer	2,000	3	51,300	2
Total	48,800	63	1,642,700	53
	ALL OWNERS			
0-5 years	4,900	6	453,700	15
5-10 years	800	1	97,500	3
Indefinite	32,500	42	1,479,300	48
Will never harvest	29,000	38	879,300	28
No answer	9,700	13	171,400	6
Total	76,900	100	3,081,200	100

**Less than 0.5 percent.

Table 31.—Estimated number of private owners of commercial forest land and the acreage they own, by size class of ownership and expected time of timber harvest, West Virginia 1975

Size class (acres)	0 to 10 years		Indefinite		Will never harvest		No answer		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
					OWNERS					
1-9	2,300	1	17,600	9	54,900	26	8,100	4	82,900	40
10-19	2,000	1	19,100	9	15,100	7	3,600	2	39,800	19
20-49	4,000	2	21,100	10	13,600	7	2,100	1	40,800	20
50-99	4,100	2	11,900	6	8,000	4	600	**	24,600	12
100-199	2,000	1	7,400	4	3,400	2	500	**	13,300	7
200-499	1,200	1	2,900	1	400	**	200	**	4,700	2
500-999	200	**	500	**	200	**	*	**	900	**
1,000+	300	**	200	**	*	**	*	**	500	**
Total	16,100	8	80,700	39	95,600	46	15,100	7	207,500	100
					ACRES OWNED					
1-9	11,800	**	63,000	1	156,200	1	26,000	**	257,000	2
10-19	24,700	**	236,200	2	188,100	2	51,300	1	500,300	5
20-49	134,400	1	643,400	6	394,100	4	55,500	1	1,227,400	12
50-99	289,700	3	804,800	7	508,300	5	51,200	1	1,654,000	16
100-199	251,800	3	941,200	9	415,100	4	49,400	**	1,657,500	16
200-499	352,900	4	808,500	8	146,900	1	39,700	**	1,348,000	13
500-999	122,700	1	293,700	4	130,600	1	23,900	**	570,900	6
1,000+	2,486,300	24	483,700	4	53,200	1	104,600	1	3,127,800	30
Total	3,674,300	36	4,274,500	41	1,992,500	19	401,600	4	10,342,900	100

* Fewer than 50 owners.
** Less than 0.5 percent.

Table 32.—Estimated number of owners harvesting timber and acres owned, by individual selecting timber and method of selection, West Virginia 1975

Individual and method of selection	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
	INDIVIDUAL SELECTING TIMBER			
Landowner	44,900	71	2,191,700	35
Forester	1,000	2	1,786,200	28
Buyer	8,400	13	1,003,800	16
Landowner and forester	600	1	279,700	4
Landowner and buyer	2,200	3	475,700	8
Other	800	1	280,500	4
No answer	5,700	9	301,900	5
Total	63,600	100	6,319,500	100
	METHOD OF SELECTING TIMBER			
Selection	10,700	17	1,235,900	20
Diameter limit	20,300	32	2,213,100	35
Clearcutting	11,100	18	575,700	9
Land clearing	4,000	6	322,300	5
Other	2,600	4	265,000	4
Combination of methods	4,500	7	986,400	16
Don't know	4,400	7	396,200	6
No answer	6,000	9	324,900	5
Total	63,600	100	6,319,500	100

Table 33.—Estimated number of owners harvesting timber and acres owned, by individual selecting timber and method of selection, Northeastern Unit, West Virginia 1975

Individual and method of selection	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
	INDIVIDUAL SELECTING TIMBER			
Landowner	16,100	64	759,400	34
Forester	300	1	419,000	19
Buyer	3,800	15	430,800	20
Landowner and forester	600	2	178,100	8
Landowner and buyer	1,400	6	184,300	8
Other	100	**	108,000	5
No answer	2,900	12	133,100	6
Total	25,200	100	2,212,700	100
	METHOD OF SELECTING TIMBER			
Selection	6,700	26	708,100	32
Diameter limit	9,000	35	493,000	22
Clearcutting	2,200	9	219,900	10
Land clearing	1,700	7	109,200	5
Other	700	3	87,800	4
Combination of methods	500	2	269,600	12
Don't know	1,400	6	181,700	8
No answer	3,000	12	143,400	7
Total	25,200	100	2,212,700	100

** Less than 0.5 percent.

Table 34.—Estimated number of owners harvesting timber and acres owned, by individual selecting timber and method of selection, Southern Unit, West Virginia, 1975

Individual and method of selection	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
	INDIVIDUAL SELECTING TIMBER			
Landowner	7,800	75	692,000	26
Forester	500	5	1,247,300	47
Buyer	1,200	12	255,800	10
Landowner and forester	*	**	89,800	3
Landowner and buyer	100	1	165,600	6
Other	300	3	112,600	4
No answer	400	4	105,200	4
Total	10,300	100	2,668,300	100
	METHOD OF SELECTING TIMBER			
Selection	1,400	13	292,900	11
Diameter limit	3,800	37	1,177,000	44
Clearcutting	700	7	147,000	6
Land clearing	200	2	135,200	5
Other	1,100	11	103,900	4
Combination of methods	1,300	13	607,100	23
Don't know	1,400	13	115,500	4
No answer	400	4	89,700	3
Total	10,300	100	2,668,300	100

* Fewer than 50 owners.
** Less than 0.5 percent.

Table 35.—Estimated number of owners harvesting timber and acres owned, by individual selecting timber and method of selection, Northwestern Unit, West Virginia 1975

Individual and method of selection	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
	INDIVIDUAL SELECTING TIMBER			
Landowner	21,000	75	740,300	52
Forester	200	1	119,900	8
Buyer	3,400	12	317,200	22
Landowner and forester	*	**	11,800	1
Landowner and buyer	700	2	125,800	9
Other	400	1	59,900	4
No answer	2,400	9	63,600	4
Total	28,100	100	1,438,500	100
	METHOD OF SELECTING TIMBER			
Selection	2,600	9	234,900	16
Diameter limit	7,500	27	543,100	38
Clearcutting	8,200	29	208,800	15
Land clearing	2,100	7	77,900	5
Other	800	3	73,300	5
Combination of methods	2,700	10	109,700	8
Don't know	1,600	6	99,000	7
No answer	2,600	9	91,800	6
Total	28,100	100	1,438,500	100

* Fewer than 50 owners.
** Less than 0.5 percent.

Table 36.—Estimated number of private owners of commercial forest land and acres owned, by individual selecting timber and method of selection, West Virginia 1975

Individual selecting timber	Selection	Diameter limit	Clearcutting	Land clearing	Other[a]	Don't know	No answer	Total
				OWNERS				
Landowner	7,500	15,700	10,000	3,400	5,700	1,400	1,200	44,900
Forester	400	500	*	*	100	*	—	1,000
Buyer	1,200	2,600	1,000	*	700	2,600	300	8,400
Landowner and forester	300	100	—	*	200	*	—	600
Landowner and buyer	1,200	400	100	—	300	200	—	2,200
Other[b]	100	200	*	200	100	200	—	800
No answer	—	800	—	400	—	—	4,500	5,700
Total	10,700	20,300	11,100	4,000	7,100	4,400	6,000	63,600
				ACRES OWNED				
Landowner	485,000	614,500	294,900	242,800	369,100	134,300	51,100	2,191,700
Forester	415,800	668,600	96,400	11,100	578,800	15,500	—	1,786,200
Buyer	105,900	478,600	89,100	15,500	105,500	182,700	26,500	1,003,800
Landowner and forester	90,300	86,100	—	11,700	78,800	12,800	—	279,700
Landowner and buyer	111,600	226,300	24,700	—	76,000	37,100	—	475,700
Other[b]	27,300	111,700	70,600	13,900	43,200	13,800	—	280,500
No answer	—	27,300	—	27,300	—	—	247,300	301,900
Total	1,235,900	2,213,100	575,700	322,300	1,251,400	396,200	324,900	6,319,500

* Fewer than 50 owners.
[a] Includes combination of methods.
[b] Includes friend or other combinations of people.

Table 37—Estimated number of private owners of commercial forest land and acres owned, by product harvested and geographic unit, West Virginia 1975

Product	Northeastern		Southern		Northwestern		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
Sawlogs	4,100	16	2,700	26	12,200	44	19,000	30
Veneer logs	*	**	100	1	1,000	4	1,100	2
Pulpwood	1,700	7	100	1	2,900	10	4,700	7
Mine timbers	6,900	27	2,100	20	—	—	9,000	14
One other product	4,400	18	—	—	400	1	4,800	8
Sawlogs and veneer	1,000	4	100	1	1,200	4	2,300	4
Sawlogs and pulpwood	1,100	4	100	1	200	1	1,400	2
Sawlogs and mine timbers	1,300	5	700	7	700	3	2,700	4
Other two-product combination	900	4	2,000	19	7,100	25	10,000	16
Three products	800	3	500	5	800	3	2,100	3
Four or more products	100	**	800	8	100	**	1,000	2
Don't know	400	2	400	4	600	2	1,400	2
No answer	2,500	10	700	7	900	3	4,100	6
Total	25,200	100	10,300	100	28,100	100	63,600	100
				ACRES OWNED				
Sawlogs	602,500	27	375,100	14	497,000	35	1,474,600	23
Veneer logs	11,100	1	13,800	1	26,100	2	51,000	1
Pulpwood	157,800	7	13,800	1	50,100	4	221,700	4
Mine timbers	26,500	1	146,000	5	—	—	172,500	3
One other product	98,900	5	—	—	49,600	3	148,500	2
Sawlogs and veneer	180,000	8	105,900	4	228,100	16	514,000	8
Sawlogs and pulpwood	170,600	8	27,600	1	26,100	2	224,300	4
Sawlogs and mine timbers	72,500	3	392,200	15	91,900	6	556,600	9
Other two-product combination	250,800	11	113,700	4	152,500	11	517,000	8
Three products	207,800	9	741,700	28	184,400	13	1,133,900	18
Four or more products	277,200	13	541,800	20	35,700	2	854,700	13
Don't know	51,200	2	62,100	2	61,300	4	174,600	3
No answer	105,800	5	134,600	5	35,700	2	276,100	4
Total	2,212,700	100	2,668,300	100	1,438,500	100	6,319,500	100

* Fewer than 50 owners.
** Less than 0.5 percent.

Table 38.—Estimated number of private owners of commercial forest land and acres owned, by agency that owners would contact for forestry assistance, West Virginia 1975

Agency	Northeastern		Southern		Northwestern		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
State forestry	9,300	13	5,300	9	6,900	9	21,500	11
Soil Conservation Service	4,500	6	800	1	9,800	13	15,100	7
Forest Service	1,000	1	*	**	500	1	1,500	1
Agricultural Stabilization and Conservation Service	3,600	5	—	—	1,000	1	4,600	2
Consultant or industry forester	*	**	300	1	200	**	500	*
Extension Service	200	**	*	**	4,500	6	4,700	2
Other	1,400	2	500	1	2,400	3	4,300	2
Don't know	29,600	40	36,600	64	35,500	46	101,700	49
No answer	23,800	33	13,700	24	16,100	21	53,600	26
Total	73,400	100	57,200	100	76,900	100	207,500	100
				ACRES OWNED				
State forestry	1,154,500	32	524,500	14	558,600	18	2,237,600	22
Soil Conservation Service	120,300	3	43,200	1	248,500	8	412,000	4
Forest Service	76,700	2	13,800	**	26,200	1	116,700	1
Agricultural Stabilization and Conservation Service	116,000	3	—	—	88,900	3	204,900	2
Consultant or industry forester	265,900	8	1,394,100	38	35,700	1	1,695,700	16
Extension Service	37,600	1	13,800	**	47,900	2	99,300	1
Other	38,400	1	27,600	1	36,200	1	102,200	1
Don't know	1,101,200	31	1,316,900	36	1,450,900	47	3,869,000	37
No answer	658,500	19	358,700	10	588,300	19	1,605,500	16
Total	3,569,100	100	3,692,600	100	3,081,200	100	10,342,900	100

* Fewer than 50 owners.
** Less than 0.5 percent.

Table 39.—Estimated number of private owners of commercial forest land and acres owned, by owners who have received forestry assistance and nature of service, West Virginia 1975

Service	Northeastern		Southern		Northwestern		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
Timber marking	2,100	3	500	1	700	1	3,300	2
Timber stand improvement	3,000	4	300	1	7,100	9	10,400	5
Tree planting	500	1	1,400	2	1,200	2	3,100	1
Timber stand evaluation	2,100	3	300	1	200	**	2,600	1
General forest management	1,700	2	500	1	400	1	2,600	1
Other	4,300	6	300	1	800	1	5,400	3
No answer	62,300	85	54,500	95	67,700	88	184,500	89
Total	73,400	100	57,200	100	76,900	100	207,500[a]	100
				ACRES OWNED				
Timber marking	267,100	7	101,700	3	72,800	2	441,600	4
Timber stand improvement	291,000	8	206,900	6	146,100	5	644,000	6
Tree planting	69,100	2	86,700	2	110,700	4	266,500	3
Timber stand evaluation	180,900	5	223,000	6	74,000	2	477,900	5
General forest management	558,800	16	1,474,200	40	182,700	6	2,215,700	21
Other	294,300	8	162,100	4	120,300	4	576,700	6
No answer	2,298,800	64	1,747,100	47	2,544,200	83	6,590,100	64
Total	3,569,100	100	3,692,600	100	3,081,200	100	10,342,900[a]	

** Less than 0.5 percent.

[a] 23,000 owners (11 percent) owning 3,752,800 acres (36 percent) received some kind of forestry assistance.

Columns do not add because some received more than one service.

Table 40.—Estimated number of private owners permitting and not permitting public use of their land, by geographic unit, West Virginia 1975

Public use	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
		NORTHEASTERN		
Permitted	52,300	71	2,182,100	61
Not permitted	16,300	22	1,264,200	36
No answer	4,800	7	122,800	3
Total	73,400	100	3,569,100	100
		SOUTHERN		
Permitted	27,100	47	2,752,500	74
Not permitted	17,700	31	726,200	20
No answer	12,400	22	213,900	6
Total	57,200	100	3,692,600	100
		NORTHWESTERN		
Permitted	44,400	58	1,812,800	59
Not permitted	27,100	35	1,056,700	34
No answer	5,400	7	211,700	7
Total	76,900	100	3,081,200	100
		TOTAL		
Permitted	123,800	60	6,747,400	65
Not permitted	61,100	29	3,047,100	30
No answer	22,600	11	548,400	5
Total	207,500	100	10,342,900	100

Table 41.—Estimated number of private owners of commercial forest land and acres owned, by public use permitted and geographic unit, West Virginia 1975

Public use	Northeastern		Southern		Northwestern		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
					OWNERS			
Hiking	40,000	54	12,600	22	23,200	30	75,800	37
Picnicking	21,500	29	6,600	12	14,900	19	43,000	21
Camping	21,400	29	3,500	6	10,300	13	35,200	17
Fishing	3,800	5	1,300	2	5,300	7	10,400	5
Hunting	41,100	56	23,800	42	35,800	47	100,700	49
Snowmobiling	15,900	22	3,100	5	4,700	6	23,700	11
Other	2,100	3	2,300	4	1,200	2	5,600	3
Total[a]	52,300	71	27,100	47	44,400	58	123,800	60
					ACRES OWNED			
Hiking	1,375,900	39	2,123,300	58	1,086,600	35	4,585,800	44
Picnicking	944,300	26	1,801,900	49	674,700	22	3,420,900	33
Camping	975,100	27	1,553,700	42	599,900	19	3,128,700	30
Fishing	847,900	24	1,406,600	38	440,800	14	2,695,300	26
Hunting	1,883,600	53	2,550,800	69	1,583,600	51	6,018,000	58
Snowmobiling	517,200	14	489,000	13	123,200	4	1,129,400	11
Other	133,200	4	382,300	10	64,000	2	579,500	6
Total[a]	2,182,100	61	2,752,500	75	1,812,800	59	6,747,400	65

[a] Columns do not add because many owners permit more than one use.

Table 42.—Estimated number of private owners of commercial forest land and acres owned, by reason for posting land and geographic unit, West Virginia 1975

Reason for posting	Northeastern		Southern		Northwestern		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				OWNERS				
Abuse of property	1,500	2	1,000	2	5,800	8	8,300	4
Personal safety	100	**	300	1	3,100	4	3,500	2
Liability	500	1	*	**	*	**	500	**
Control access	3,900	5	4,000	7	2,500	3	10,400	5
Control hunting	5,700	8	700	1	6,500	9	12,900	6
Not specified	9,100	12	2,500	4	3,400	4	15,000	7
Total posted	20,800	28	8,500	15	21,300	28	50,600	24
Land not posted	51,500	70	40,100	70	50,500	65	142,100	69
No answer	1,100	2	8,600	15	5,100	7	14,800	7
Total	73,400	100	57,200	100	76,900	100	207,500	100
				ACRES OWNED				
Abuse of property	237,900	7	202,100	5	204,700	7	644,700	6
Personal safety	59,700	2	27,600	1	90,200	3	177,500	2
Liability	48,600	1	138,100	4	11,700	**	198,400	2
Control access	534,700	15	259,200	7	223,400	7	1,017,300	10
Control hunting	490,500	14	146,500	4	374,600	12	1,011,600	10
Reason not specified	194,500	5	165,600	4	140,700	5	500,800	5
Total posted	1,565,900	44	939,100	25	1,045,300	34	3,550,300	35
Land not posted	1,919,600	54	2,651,700	72	1,867,500	61	6,438,800	62
No answer	83,600	2	101,800	3	168,400	5	353,800	3
Total	3,569,100	100	3,692,600	100	3,081,200	100	10,342,900	100

* Fewer than 50 owners.
** Less than 0.5 percent.

Table 43—Estimated number of private owners of commercial forest land and the acreage they own, by organization membership, West Virginia 1975

Organization	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
American Forestry Association	1,000	1	143,800	2
Izaak Walton League	400	**	77,500	1
Audubon Society	900	**	114,600	2
National Wildlife Federation	1,700	1	189,900	3
A Sportsman's Club	5,800	3	353,300	5
National Farmers Organization	2,700	1	178,500	3
The Grange	3,400	2	85,500	1
American Tree Farm Program	700	**	141,500	2
Other	17,600	10	558,600	9
No membership	135,300	74	4,846,300	74
No answer	16,100	9	353,600	5
Total[a]	182,100	100	6,517,500	100

** Less than 0.5 percent.

[a] Columns do not add because some owners are members of more than one organization.

Table 44.—Estimated number of individual owners of commercial forest land and the acreage they own, by publications they receive, West Virginia 1975

Publication	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
Tree Farm News	900	**	55,600	1
American Forests	600	**	78,900	1
National Wildlife	3,800	2	363,200	6
Pennsylvania Game News	600	**	48,700	1
Audubon Magazine	1,100	1	141,200	2
National Parks and Recreation	600	**	25,000	**
Field and Stream	31,000	17	956,300	15
Sports Afield	10,200	6	520,000	8
Ranger Rick Nature Magazine	800	**	106,600	2
Ohio Farmer	800	**	102,200	2
West Virginia Conservation	20,100	11	849,100	13
Pennsylvania Farmer	7,600	4	563,600	9
Other	24,700	14	1,118,000	17
No subscriptions	102,200	56	3,515,900	54
No answer	15,300	8	256,100	4
Total[a]	182,100	100	6,517,500	100

** Less than 0.5 percent.

[a] Columns do not add because some owners subscribe to more than one publication.

Table 45.—Number of responses to true-false statements, by individual owners of commercial forest land and the acreage they own, West Virginia 1975

Statement and answer	Percent correct	Response				Total
		True	False	Don't know	No answer	
			OWNERS			
1-True	76	138,800	900	21,800	20,600	182,100
2-False	57	44,000	103,900	15,600	18,600	182,100
3-True	40	73,600	2,800	80,700	25,000	182,100
4-False	25	78,100	46,200	35,400	22,400	182,100
5-False	58	14,000	105,900	40,200	22,000	182,100
6-False	11	94,800	20,900	44,000	22,400	182,100
7-False	12	68,000	22,300	68,900	22,900	182,100
8-True	6	11,300	6,700	140,000	24,100	182,100
9-False	41	52,100	74,000	34,100	21,900	182,100
10-True	59	108,000	6,600	45,600	21,900	182,100
			ACRES OWNED			
1-True	85	5,510,800	65,500	416,500	524,700	6,517,500
2-False	68	1,050,700	4,426,300	446,200	594,300	6,517,500
3-True	51	3,351,300	198,700	2,234,600	732,900	6,517,500
4-False	33	2,568,800	2,119,700	1,246,300	582,700	6,517,500
5-False	70	321,900	4,588,000	1,035,900	571,700	6,517,500
6-False	13	3,883,500	826,500	1,248,600	558,900	6,517,500
7-False	18	2,402,400	1,160,600	2,299,400	655,100	6,517,500
8-True	12	766,300	339,200	4,654,600	757,400	6,517,500
9-False	45	2,170,100	2,954,000	794,900	598,500	6,517,500
10-True	67	4,353,700	307,300	1,269,900	586,600	6,517,500

Table 46.—Estimated number of individual owners of commercial forest land and the acreage they own, by percent for 10 true-false statements, West Virginia 1975

Correct (percent)	Owners		Commercial forest land owned	
	Number	*Percent*	*Acres*	*Percent*
0	4,700	3	78,400	1
10	12,500	7	239,600	4
20	19,300	10	296,000	4
30	18,000	10	723,900	11
40	34,400	19	852,800	13
50	13,100	7	1,112,900	17
60	19,300	10	1,169,400	18
70	19,600	11	773,900	12
80	16,800	9	502,400	8
90	1,000	1	168,300	3
100	*	**	11,100	**
"Don't know" to all questions	16,200	9	431,500	7
No answer to all questions	6,900	4	131,300	2
Some "Don't know", others no answer	300	**	26,000	**
Total	182,100	100	6,517,500	100

* Fewer than 50 owners.
** Less than 0.5 percent.

☆U.S. GOVERNMENT PRINTING OFFICE: 1978—703-112:44

Birch, Thomas W., and Neal P. Kingsley.
1978. **The forest-land owners of West Virginia.** Northeast. For. Exp. Stn., Broomall, Pa.
76 p., illus. (U.S. Dep. Agric. For. Serv. Resour. Bull. NE-58).

A statistical-analytical report on the owners of privately owned commercial forest land in West Virginia. The study was conducted in conjunction with the third forest survey of West Virginia by the Forest Service, U.S. Department of Agriculture. Statistical findings are based on responses of owners to a mailed questionnaire. Also included are trends in forest-land ownership and the attitudes and intentions of owners for categories such as reasons for owning forest land, timber management, timber harvesting, and recreational use.

923: (754)

Keywords: forest-land owners, available timber, timber harvesting, forestry assistance, recreation

Birch, Thomas W., and Neal P. Kingsley.
1978. **The forest-land owners of West Virginia.** Northeast. For. Exp. Stn., Broomall, Pa.
76 p., illus. (U.S. Dep. Agric. For. Serv. Resour. Bull. NE-58).

A statistical-analytical report on the owners of privately owned commercial forest land in West Virginia. The study was conducted in conjunction with the third forest survey of West Virginia by the Forest Service, U.S. Department of Agriculture. Statistical findings are based on responses of owners to a mailed questionnaire. Also included are trends in forest-land ownership and the attitudes and intentions of owners for categories such as reasons for owning forest land, timber management, timber harvesting, and recreational use.

923: (754)

Keywords: forest-land owners, available timber, timber harvesting, forestry assistance, recreation

Headquarters of the Northeastern Forest Experiment Station are in Broomall, Pa. Field laboratories and research units are maintained at:

- Beltsville, Maryland.
- Berea, Kentucky, in cooperation with Berea College.
- Burlington, Vermont, in cooperation with the University of Vermont.
- Delaware, Ohio.
- Durham, New Hampshire, in cooperation with the University of New Hampshire.
- Hamden, Connecticut, in cooperation with Yale University.
- Kingston, Pennsylvania.
- Morgantown, West Virginia, in cooperation with West Virginia University, Morgantown.
- Orono, Maine, in cooperation with the University of Maine, Orono.
- Parsons, West Virginia.
- Pennington, New Jersey.
- Princeton, West Virginia.
- Syracuse, New York, in cooperation with the State University of New York College of Environmental Sciences and Forestry at Syracuse University, Syracuse.
- Warren, Pennsylvania.

CLEMSON
LIBRARY

PENNSYLVANIA TIMBER INDUSTRIES – A PERIODIC ASSESSMENT OF TIMBER OUTPUT

CLEMSON UNIVERSITY LIBRARY
MAY 14 1979
SCI., TECH. & AGR. DIV.

by James T. Bones
and John K. Sherwood, Jr.

USDA FOREST SERVICE RESOURCE BULLETIN NE-59
1979
FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE
NORTHEASTERN FOREST EXPERIMENT STATION
370 REED ROAD, BROOMALL, PA. 19008

The Authors

JAMES T. BONES is a Research Forester in the Resources Evaluation unit at the Northeastern Forest Experiment Station, Broomall, Pa. He is Group Leader of the timber removals and industry analysis branch, specializing in timber utilization and primary timber industry trend analysis. He received a B.S. degree in 1952 and M.S. degree in 1956 from Utah State University. In 1978 he completed a year of postgraduate studies at Pennsylvania State University. Before transferring to the Northeastern Forest Experiment Station in 1968, he worked at the Pacific Northwest Forest and Range Experiment Station and the Institute of Northern Forestry, and was a United Nations forestry advisor to the Government of Colombia in South America.

JOHN K. SHERWOOD, JR., received his B.S. degree in forestry from The Pennsylvania State University in 1961. He joined the Pennsylvania Department of Environmental Resources in 1962 and served as a service forester until 1965 when he moved to the Department Headquarters in Harrisburg to assist local industries as a utilization and marketing forester. In 1977 he transferred to Clearfield, Pa., where he is Assistant District Forester of the Moshannon Forest District.

MANUSCRIPT RECEIVED FOR PUBLICATION 10 JANUARY 1979

Abstract

A periodic evaluation of statewide industrial timber output based on a survey of the primary wood-manufacturing plants in Pennsylvania. Contains statistics on the industrial timber harvest and plant wood-receipts in 1976, and the production and disposition of the manufacturing residues that resulted. The 166 million cubic feet of industrial wood produced in 1976 represented a 12-percent increase in production since 1969 when the previous survey was made. Although sawlog and pulpwood production increased during the period, cooperage log and mine timber production decreased. Other trends in industrial product output and use of manufacturing residue are presented along with 20 statistical tables.

PENNSYLVANIA TIMBER INDUSTRIES—A PERIODIC ASSESSMENT OF TIMBER OUTPUT

CONTENTS

HIGHLIGHTS 1

BACKGROUND 2

CURRENT INDUSTRY TRENDS 2

INDUSTRIAL TIMBER HARVEST ... 3

LUMBER AND SAWLOGS 4

PULPWOOD 6

OTHER TIMBER PRODUCTS 8
- Veneer logs 8
- Bats and handles 8
- Cooperage 8
- Mine timbers 9

MANUFACTURING RESIDUES 9

REFERENCES 10

DEFINITION OF TERMS 11
- Species 11
- Harvest 11
- Manufacture 11
- Residues 11

INDEX TO TABLES 12

HIGHLIGHTS

The 1976 timber-industry survey in Pennsylvania showed that since 1969:

- Total timber output has increased 12 percent to 166 million cubic feet.
- Sawlog production has increased 19 percent to 644 million board feet.
- Pulpwood production has increased 7 percent to 625 thousand cords.
- The number of operating sawmills has risen from 684 to 740.

Round timber conversions for major products:

Softwood logs: M bd ft (Int. ¼-inch) = 164.91 ft^3 = 4.67 m^3
Hardwood logs: M bd ft (Int. ¼-inch) = 160.64 ft^3 = 4.55 m^3
Pulpwood: 1 Standard cord = 85 ft^3 = 2.41 m^3

BACKGROUND

THE USDA FOREST SERVICE conducts continuing forest surveys of all states to provide up-to-date information about the timber and other related resources of the Nation. In the 14-state region served by the Northeastern Forest Experiment Station, all states have been surveyed at least twice. Pennsylvania has now been inventoried for the third time. The latest survey included a reevaluation of the State's timber industries to determine the current output of timber products and the volume and disposition of primary wood-product manufacturing residues.

This report is the result of a 100-percent canvass of all primary wood-product manufacturers but sawmills. Since Pennsylvania sawmills had previously been contacted for 1974 sawlog receipts statistics, a representative sample of sawmills were contacted in order to update the 1974 statistics to 1976. Pulpwood and veneer log production data were gathered as part of the Station's product survey program for the entire Northeast. Pennsylvania's Department of Environmental Resources was a major cooperator during the survey. It furnished an updated list of primary manufacturers and assisted by contacting wood processors who failed to respond to our information request.

This report deals for the most part with statistics for 3 years: 1976, the calendar year of the current timber industry evaluation, and 1964 and 1969, the calendar years of the previous complete industry surveys. The reader is reminded that these years may or may not be representative for the various Pennsylvania timber industries covered in this report. When documented production statistics were available for individual timber products for previous or intervening years, they were included for comparison.

Long-term production trends may be indicated by repeated industry surveys in the future. Until a data base is built up over time, the reader is cautioned to use the current statistics prudently.

CURRENT INDUSTRY TRENDS

Pennsylvania timberlands support a variety of valuable hardwood species such as black cherry, white ash, red and white oaks, and hard maple. In the past it was the practice to harvest high-value individual trees of these species and leave trees of less desirable species and those with poor form and low value. This type of harvesting has become very expensive, and typically leaves large numbers of residual trees and logging debris per unit of volume recovered. Immediately after harvesting, these residual stands have no further economically feasible use, and they are visually and environmentally unacceptable.

A primary goal for industry should be to provide for the complete and highest use of the State's timber resources. This means that more wood fiber should be recovered and channeled to the wood-using industry best suited to convert each class of roundwood from each forested acre. Such newly developed equipment as rubber-tired skidders and total-tree systems are well suited for harvesting hardwood timber stands, but this equipment represents a substantial investment.

Prospects are high for an increase in demand for Pennsylvania timber products by coal-mining and rail-transportation industries. Heavy industry and public utilities are committed to decreasing their dependence on petroleum through increased use of coal. As more underground coal is extracted to meet the increase in demand, greater quantities of wood will be needed for shoring, bracing, and other miscellaneous support materials.

Pennsylvania tie-treating plants that are responding to the Federal program for revitalizing and upgrading the long-neglected eastern rail system have not been able to attract the volume of ties they require. Demand for ties is expected to be high for many years to come.

During the last decade, as public concern for the environment grew and pollution-abatement laws were enforced with more vigor, many woodpulp companies have been forced to either commit huge sums of capital to sometimes old, low-production facilities or discontinue operations. Three such low-production pulpmills were closed in Pennsylvania during the period, but one innovative company came up with a unique compromise. Hammermill Paper Company closed its Lock Haven soda pulpmill but continued to operate its papermaking facilities there by shipping woodpulp from the Company's Erie pulpmill in a "unit train." By using special high-capacity gondola cars the train hauls enough woodpulp to satisfy the papermill's requirement at Lock Haven and backhauls pulpwood bolts and chips to the Erie pulpmill, completing the cycle twice a week.

As concerns over high energy costs continue and new technology is developed, the forests will be used to a greater extent as a source of supplemental energy. Multiproduct logging in Pennsylvania hardwood stands is being translated into greater product recovery and an increase in the total volume of wood that reaches the processing plant. Much of this additional wood fiber and bark is only suitable to be substituted for oil or gas as boiler fuel. Numerous mill operators, however, have installed scragg mills to process the increasing volume of small sawlogs more efficiently. In many cases, headsaws are being used to square two sides of the log only, before it is passed to a system of edgers or a gang saw for final breakdown into lumber, dimension, or pallet parts.

In the wood-manufacturing industry, growth can be facilitated by consolidating producers of a diversity of products. Some of Pennsylvania's most successful veneer and lumber manufacturers have merged with other local, regional, and national enterprises during the past decade, adding an additional element of flexibility to their operations and assuring that the financial resources needed for future expansion will be available. In Ridgeway, for example, a veneer plant has recently been purchased and converted from a slicing to a rotary-peeling operation. The new plant, with an 80-million-square-foot capacity, will create an additional outlet for local veneer-quality hardwood logs.

A favorable exchange rate for European purchasers of United States goods has stimulated demand for quality hardwood lumber. At the same time, new low-cost dehumidifier kilns have made it profitable for medium-production hardwood sawmills in Pennsylvania to install these lumber dryers in order to take advantage of the increase in the export trade.

INDUSTRIAL TIMBER HARVEST

Timber industries used over 166 million cubic feet of timber from the forests of Pennsylvania in 1976. About 93 percent of this volume was from hardwood trees. Sawlogs were the major timber product, accounting for more than 62 percent of the total harvest. Pulpwood production ranked second in volume, accounting for 32 percent of the total. Other timber products that made up a minor portion of the harvest were veneer and cooperage logs, mine timbers, bat and handle stock, posts, charcoal wood, and wood fiber products.

Overall, the timber harvest in Pennsylvania has increased by 12 percent since the last industry survey was made in 1969, and by 10 percent since 1964 when the last complete reinventory of the state's forest resources was carried out. The two major timber products—sawlogs and pulpwood—were responsible for the gain in timber harvest between 1969 and 1976. Although veneer-log production varied little during the period, all other products registered production declines ranging from 21 percent for mine timbers to 58 percent for cooperage logs.

Virtually the entire production gain was due to an increase in the harvest of Pennsylvania hardwoods for sawlogs and pulpwood. In fact between 1969 and 1976, when the pulpwood harvest from hardwoods increased

by 11 percent, the harvest from softwoods decreased by 34 percent from 4.7 million cubic feet to 3.1 million cubic feet.

In 1976 most of the industrial timber harvest came from Pennsylvania's north-central region (Fig. 1). This region alone accounted for 43 percent of the entire harvest. Since 1969, the harvest has increased in all regions of the state but the south-central. This region registered a 9-percent decline, even though the sawlog harvest increased by 25 percent during the period. A 49-percent decline in the pulpwood harvest was responsible for the overall production loss. The largest percentage harvest gain was registered in the northeastern region. Production increased by 31 percent, from 15.9 million cubic feet in 1969 to 20.9 million cubic feet in 1976. Most of the gain was due to a 68-percent increase in the pulpwood harvest within the region.

Pennsylvania's north-central region had the largest sawlog and pulpwood harvest in 1976. The sawlog harvest of 39.6 million cubic feet represented 38 percent of the state total and the pulpwood harvest, 30.1 million cubic feet, represented 57 percent of the state total. Over half of the minor products harvested in Pennsylvania came from the state's western region.

LUMBER AND SAWLOGS

Pennsylvania has been an important lumber-producing state for over a century. In 1860 the state reported the Nation's highest lumber production; however, this was based mainly on softwood production. During the census years 1889 and 1899, when total lumber production peaked in Pennsylvania, more than 1.8 billion board feet of softwood lumber

Figure 1.—Harvest of industrial timber in Pennsylvania, by geographic region and major product, 1976.

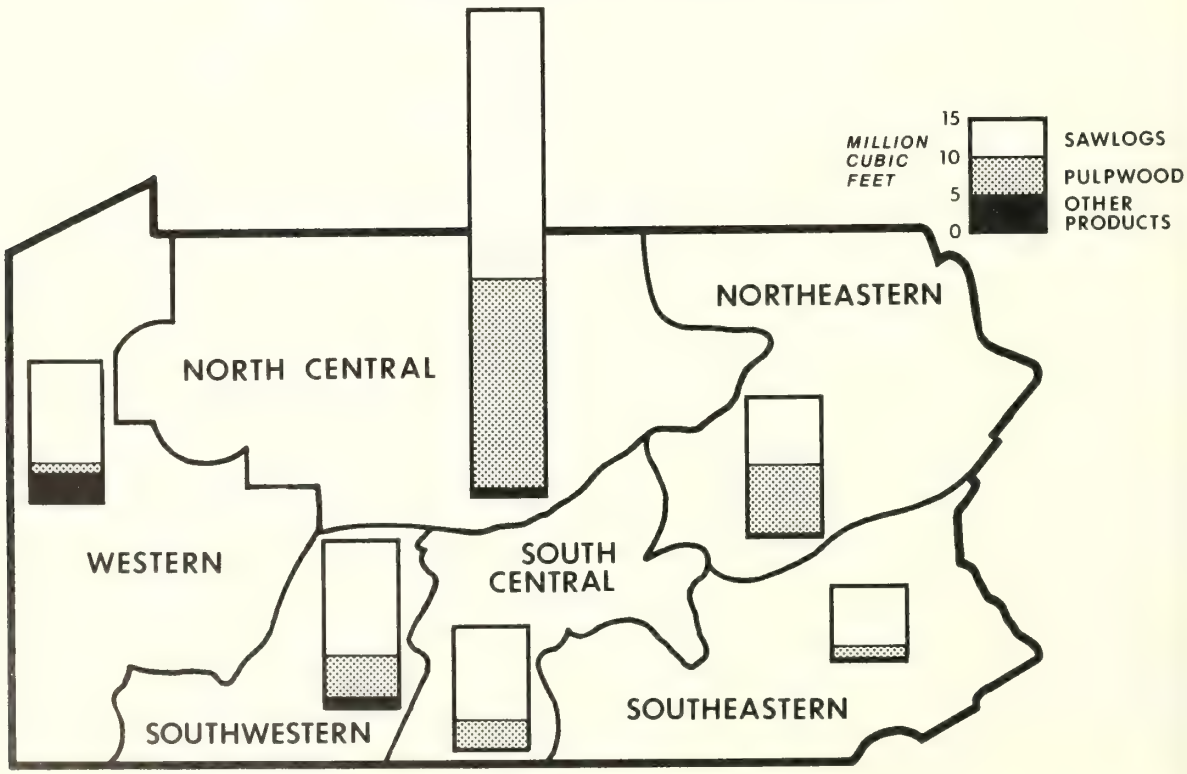
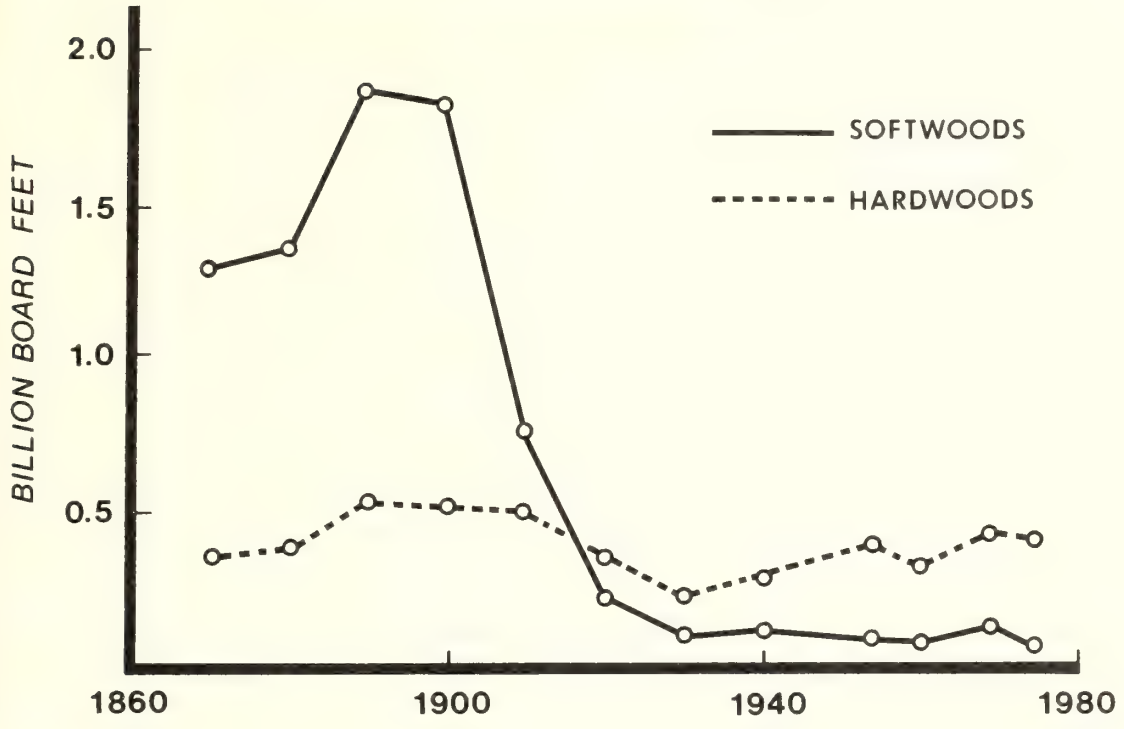


Figure 2.—Lumber production in Pennsylvania for selected years between 1869 and 1975.



was produced (Fig. 2). During the next 3 decades softwood lumber production slumped, and by 1920 more hardwood lumber was produced than softwood. Softwood lumber production has continued to decrease and hardwood lumber production has stabilized at between 400 and 500 million board feet annually.

The number of sawmills operating in Pennsylvania has generally followed fluctuations in lumber production. At the turn of the century, more sawmills were operating than at any other time; 1,501 sawmills operated in 1899. As production dwindled over the years, the number of sawmills dropped to a low of 211 in 1932. When lumber demand rose during the 1940's, the number of sawmills in operation rose to a record high of 2,745 in 1947.

Since then lumber production and the number of operating sawmills has dropped. Our industry study shows that 740 sawmills operated during 1976. This total is considerably less than the 999 sawmills operating in 1964, but more than the 684 sawmills that were operating during the last industry survey in 1969.

Since 1964 the number of low-production sawmills (producing less than .5 million board feet annually) has dropped from 667 to 388, while the number of high-production sawmills (producing over 1 million board feet annually) has risen from 167 to 206. This trend is consistent with most other regions of the country; low-production, portable, and part-time sawmills are being replaced by full-time, high-production stationary units.

Five of the six geographic regions of Pennsylvania show an increase in the number of sawmills operating between 1969 and 1976, while all regions registered a decrease in the number of sawmills operating between 1964 and 1969. The southeastern region shows a decrease in number for both periods; from 117 in 1964 to 81 in 1969 and 77 in 1976. This drop in number of operating sawmills was due entirely to a loss of low-production sawmills.

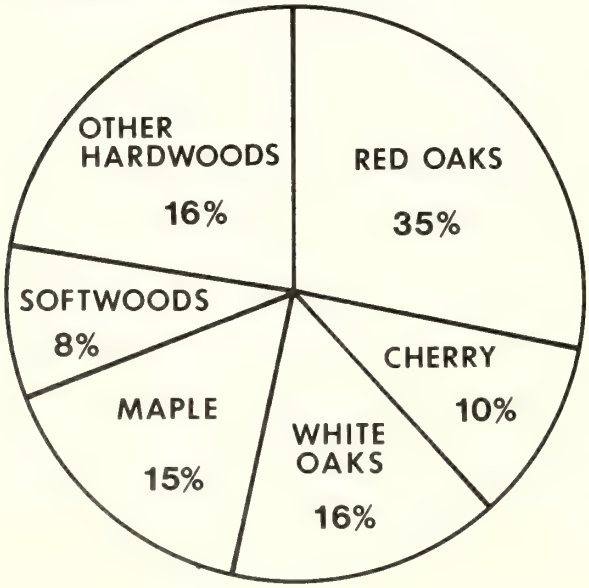
Sawlog production in 1976 was 644 million board feet, a 19-percent increase over 1964 and 1969. The north-central region, which registered a 9-percent decline in production

between 1964 and 1969, led the state between 1969 and 1976 with a 28-percent increase in production. Pennsylvania's south-central region, which showed the greatest production increase between 1964 and 1969, continued to increase production from 68 million board feet in 1969 to 85 million board feet in 1976, a 26-percent increase.

Ninety-two percent of the total sawlog production in 1976 was from hardwood trees. Red oaks accounted for 35 percent of the total volume and white oaks accounted for an additional 16 percent (Fig. 3). Other important hardwood species included hard and soft maple, and black cherry. Major components of the softwood sawlog production were white pine and hemlock.

In 1976 the western, north-central, and southeastern regions were net exporters of sawlogs and the southwestern, northeastern, and south-central regions were net importers. Most of the exports were interregional transfers rather than out-of-state shipments. Statewide, Pennsylvania was a net importer of sawlogs, shipping only 2.2 million board feet of logs to manufacturers in other states, while receiving 28.7 million board feet of sawlogs from log processors in other states. Most of the imported logs—11.5 million board feet—came from New York. Pennsylvania timber harvesters shipped more sawlogs to West Virginia for manufacture than to any other state.

Figure 3.—Pennsylvania sawlog production, by species, in percent, 1976.



PULPWOOD

More than 625 thousand cords of pulpwood were harvested from Pennsylvania timberlands in 1976, and in addition, more than 284 thousand cord equivalents of pulp chips were recovered from the primary wood-product manufacturing plants of the state (Fig. 4). Although the volume of wood from plant residues is again approaching the record high level of 309 thousand cords of 1974, the total roundwood harvest is down 84 thousand cords from 1973, when 709 thousand cords of roundwood were harvested. Four percent of the 1976 pulpwood production came from softwoods, 65 percent from hardwoods, and 31 percent from manufacturing residues (Fig. 5). Most of the softwood harvest was pine. Oaks and hickory represented 38 percent of the total round timber harvest. Yellow-poplar, hard and soft maple, beech, and birch made up the remainder of the pulpwood harvest.

Since 1690 when the first papermill in the United States was started in Roxborough, Pennsylvania, the state has always been an important pulp producer. Between 1899 and 1927 the state ranked among the first five states in pulpwood consumption and woodpulp production. In 1904, the 243 thousand cords of pulpwood consumed by Pennsylvania mills represented 8 percent of the United States total. Sixteen years later the consumption of 490 thousand cords again represented 8 percent of the national total. During this period, the state maintained its dominance by importing large quantities of pulpwood from the South and from Canada. Then, as pulp industries developed in the South and West, Pennsylvania's percentage of the Nation's woodpulp production dropped from 6.3 percent in 1923 to only 1.8 percent in 1952. In recent years, the local woodpulp industry has continued to grow mainly by adding production capacity to existing mills. The daily pulping capacity of Pennsylvania pulpmills has risen from 1,163 tons in 1955, to 2,102 tons in 1968, and finally to 2,545 tons in 1976. This represents a 6-percent average

Figure 4.—Pulpwood production in Pennsylvania, by source, 1967-1976.

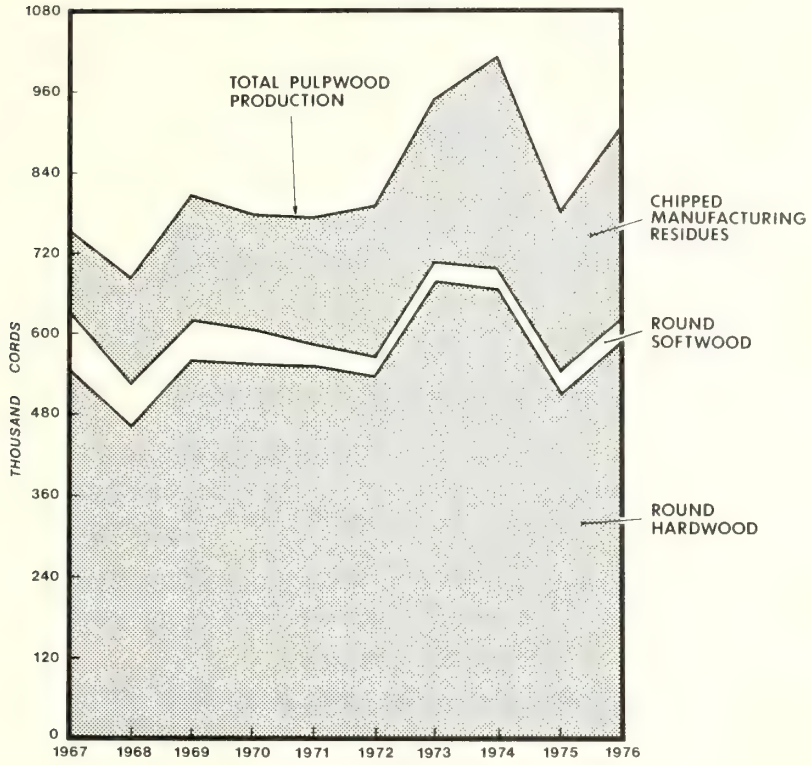
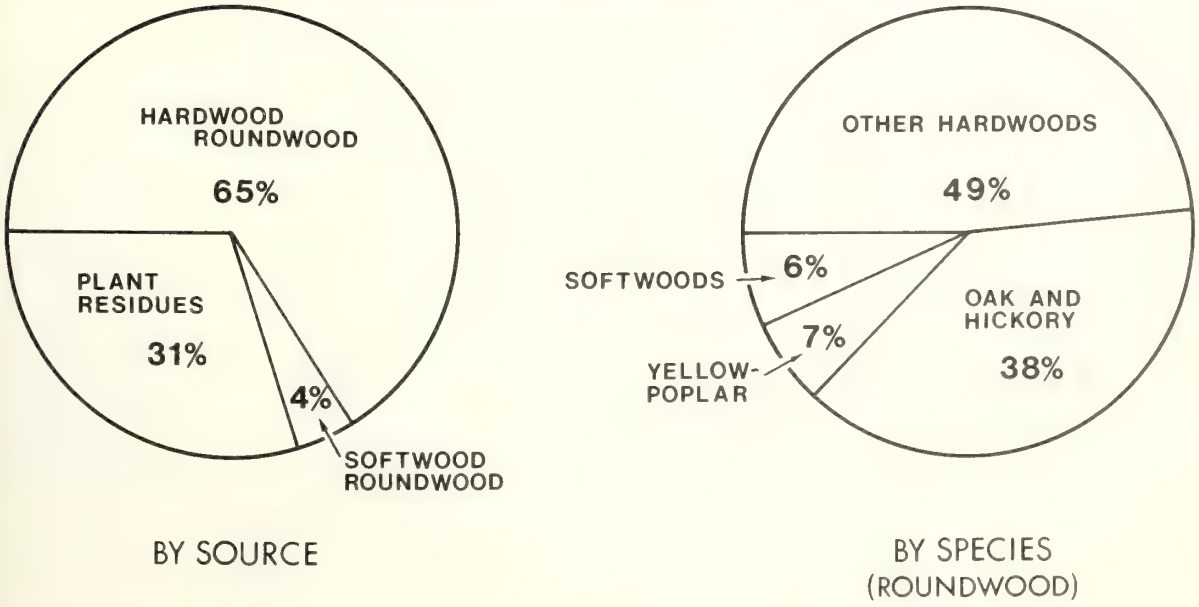


Figure 5.—Pennsylvania pulpwood production, in percent, 1976.



annual increase since 1955, while the number of operating pulpmills has dropped from 15 to 9.

About 6.1 million cords of pulpwood have been harvested from Pennsylvania timberlands during the last decade (Table 16). Most of it came from the north-central and northeastern regions. During 7 of the 10 years between 1967 and 1976, at least one Pennsylvania county has produced more than 50 thousand cords of pulpwood. The Clearfield County pulpwood harvest has exceeded 50 thousand cords during 5 years of the decade. The 326 thousand cords of production represented 10 percent of the total harvest during the 5 years.

During 1976 over 59 thousand cords of pulpwood harvested from Pennsylvania timberlands were shipped to other states for manufacture, however, Pennsylvania pulpmills received 105 thousand cords of softwoods and 38 thousand cords of hardwoods from other states and regions to satisfy their wood requirements.

OTHER TIMBER PRODUCTS

Veneer logs

Limited quantities of veneer have been manufactured in Pennsylvania for many years, but traditionally greater volumes of veneer logs have been shipped to other states for manufacture. Veneer-log production and receipts for selected years, in millions of board feet, International ¼-inch log rule, illustrate this:

Year	*Production*[a]	*Receipts*[a]
1954	4.6	0.5
1963	12.2	1.7
1968	16.5	4.8
1969	15.1	7.6
1972	12.3	7.4
1976	14.7	10.7

[a]Does not include veneer logs that passed directly through brokers or concentrators for overseas shipment.

The 14.7 million board feet of veneer logs harvested from Pennsylvania timberlands in 1976 represent a 20-percent increase over 1972, but an 11-percent decrease from the previous record high of 16.5 million board feet registered in 1968. Only 45 percent of the veneer-log harvest was retained in the state for manufacture. Over 8 million board feet was shipped for processing to plants in 10 other states and 1 Canadian province. Virginia and West Virginia were the major recipients; black cherry and red oak were the major species shipped. Red oak was also the major species of veneer logs retained by local manufacturers, making up 86 percent of the volume retained.

In addition to the locally harvested veneer logs, Pennsylvania veneer manufacturers received logs from seven other states in 1976. Most of the incoming shipments were from West Virginia. Red oak constituted 80 percent of the incoming volume.

Bats and handles

Although white ash is a minor species in Pennsylvania's most important forested regions, it is the mainstay of one of its most stable wood-using industries—bat and handle manufacturing. Ten plants were operating in 1976, and 8.7 million board feet of ash were harvested that year from timberlands within the State. This compares with 12 plants and 12.8 million board feet in 1964 and 15 plants and 13.7 million board feet in 1969. In addition, 4 million board feet of ash were shipped in from other states for processing in 1969 and about 2 million board feet were imported in 1976. Most of the ash for bats and handles was harvested in the north-central region in 1976.

Cooperage

Cooperage-log production is another relatively stable component of the Pennsylvania timber harvest. In 1954, six cooperage plants processed more than 2 million board feet of white oak. Ten years later, production had climbed to over 5 million board feet, and in 1969 production reached a high of 9.7 million board feet. In 1976, the three operating plants in Pennsylvania processed 4.2 million board feet of white oak, 3.7 million board feet of which were harvested from local timberlands.

Mine timbers

Over the years, the coal mines of Pennsylvania have depended upon the local timberlands as a source of mine props and shoring material. The increased concern over mine safety has no doubt stimulated demand. The 4.6 million cubic feet of local wood used as round and split mine timbers in underground coal mines in 1976 is 21 percent less than was required in 1969, when more coal was being produced.

MANUFACTURING RESIDUES

As energy costs continue to climb, and dependable and readily available sources of pulp chips become more important, primary manufacturing residues increase in utility and value. Stringent air- and water-pollution laws in the State have discouraged wood-product manufacturers from open burning or dumping their residues, and have encouraged them to seek pulpmills and other markets for these surplus materials.

More than 73 million cubic feet of residues were generated by the primary wood-product manufacturers of Pennsylvania in 1976. Of this, 60 million cubic feet was woody material and 13 million cubic feet was bark. Some 38 million cubic feet of the woody residue was suitable for conversion into chips for fiber products. Seventy-nine percent of all residues—58 million cubic feet—was used. While 72 percent of the bark residue was recovered and used, 81 percent of the wood residue was used.

When the results of the 1976 study in Pennsylvania were compared with the previous study (Bones and Sherwood 1972) made in 1969, some important trends were identified (Fig. 6).

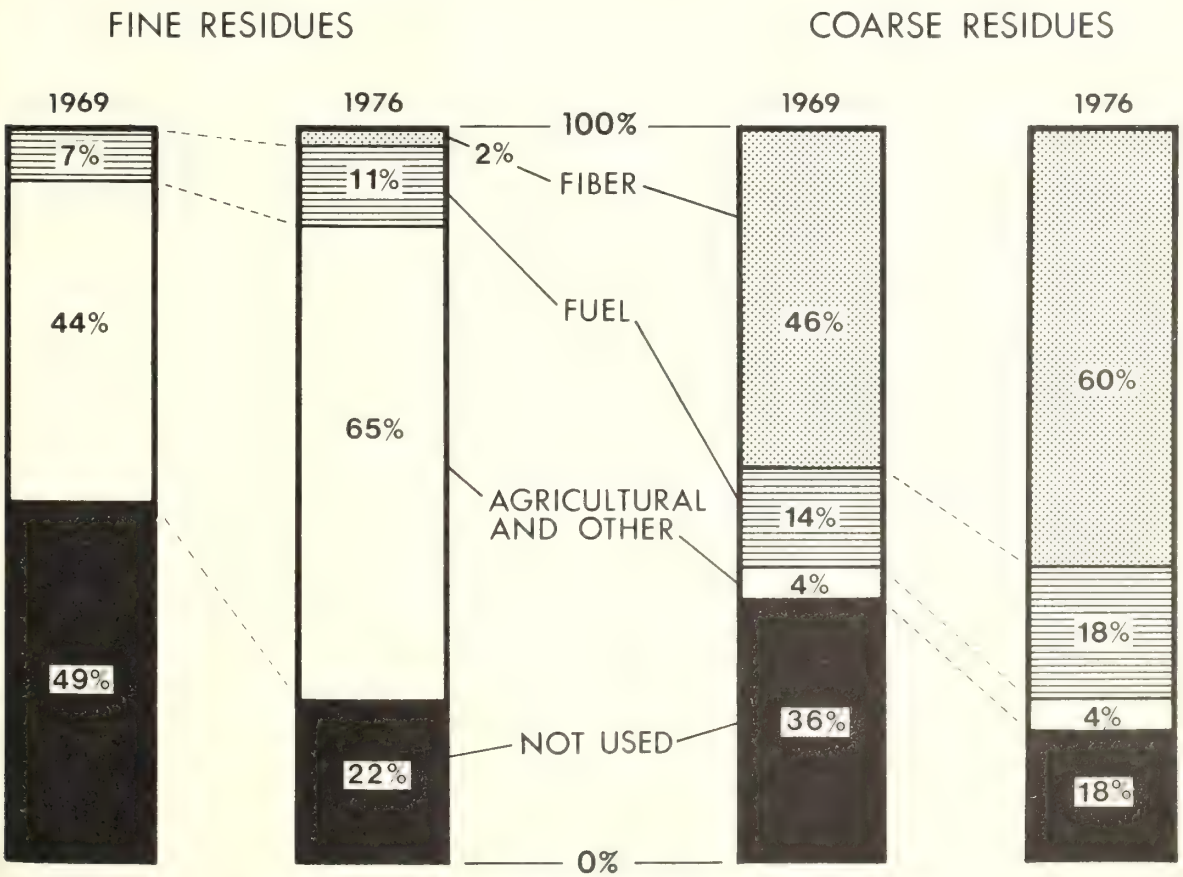


Figure 6.—Use of wood residue in Pennsylvania, in percent, 1969 and 1976. (See Table 19 for definition of terms.)

- A 27 percent greater volume of fine wood residues and an 18 percent greater volume of coarse wood residues were being used in 1976 than in 1969.
- A 14 percent greater volume of coarse residues was being used for fiber-product chips in 1976 than in 1969. Fine residues were being used in fiber products for the first time in Pennsylvania.
- A 4 percent greater volume of wood residues was being used for fuel in 1976 than in 1969.
- A 21 percent greater volume of fine residues was being used for such products as livestock bedding, horticultural mulch, and charcoal in 1976 than in 1969.

The use of bark residues grew rapidly in Pennsylvania between 1969 and 1976. In 1969, only a third of the bark accumulating at the state's primary wood-manufacturing plants was being used. It presented a tremendous solid-waste disposal problem.

In 1976, nearly 72 percent of the bark residue was used. Most of the increase can be attributed to the development of markets for bark mulch. Many state highway departments and private landscaping contractors are using hardwood bark as a mulch for landscaping and reseeding projects. In addition, with the high cost of energy, many wood-manufacturing plants are switching to bark and other residues as boiler fuel.

REFERENCES

Bones, J. T., and J. Sherwood.
1972. **Primary wood-product industries of Pennsylvania—1969.** USDA For. Serv. Resour. Bull. NE-27. 35 p.

Ferguson, Roland H.
1958. **The timber resources of Pennsylvania.** A report on the forest survey made by the U.S. Forest Service. Northeast. For. Exp. Stn., Upper Darby, Pa. 46 p.

Ferguson, Roland H.
1968. **The timber resources of Pennsylvania.** USDA For. Serv. Resour. Bull. NE-8. 147 p.

DEFINITION OF TERMS

Species

Softwoods. Coniferous trees, usually evergreen with needles or scalelike leaves.

Hardwoods. Dicotyledonous trees, usually broad-leaved and deciduous.

Harvest

Timber products output. Includes roundwood (round timber) products harvested from growing stock on commercial forest land; from other sources, such as cull trees, salvable dead trees, limbs and tops, and saplings; from trees on noncommercial and nonforest lands; and from manufacturing plant byproducts.

Industrial timber harvest. Total production of round timber for conversion into wood products.

Logging residues. The unused portions of trees harvested or killed in the process of logging.

Manufacture

Primary wood-manufacturing plant. A plant that converts round timber to wood products such as woodpulp, lumber, veneer, cooperage, and dimension.

Roundwood products. Logs, bolts, and other round timber generated from harvesting trees for industrial or consumer uses.

Sawlog. A roundwood product, from which products such as lumber are sawn, and which meets certain minimum standards of diameter, length, and defect, including a minimum 8-foot length and combinations of size and defect specified in regional standards.

Pulpwood. Roundwood or plant byproducts cut (into 4- or 5-foot lengths or chipped) and prepared for manufacture into woodpulp.

Residues

Manufacturing plant residues. Wood materials that are generated when round timber (roundwood) is converted into wood products; includes slabs, edgings, trimmings, miscuts, sawdust, shavings, veneer cores and clippings, and pulp screenings.

Plant byproducts. Wood products, such as pulp chips, recycled from manufacturing plant residues.

Unused manufacturing residues. Plant residues that are dumped or destroyed and not recovered for plant byproducts.

Coarse residues. Manufacturing residues suitable for chipping, such as slabs, edgings, and veneer cores.

Fine residues. Manufacturing residues not suitable for chipping, such as sawdust and shavings.

INDEX TO TABLES

INDUSTRIAL TIMBER PRODUCTS

1. Volume of industrial timber, by product harvested, Pennsylvania, 1976.
2. Change in timber products output in Pennsylvania between 1969 and 1976.
3. Industrial timber harvest in Pennsylvania, by geographic region, species group and product, 1976.

SAWLOG STATISTICS

4. Number of operating sawmills in Pennsylvania by geographic region and annual production class, 1964, 1969, and 1976.
5. Sawlog production and receipts relationships in Pennsylvania by geographic region, between 1969 and 1976.
6. Sawlog production for Pennsylvania, by species group, geographic region, and where received, 1976.
7. Sawlog receipts for Pennsylvania, by species group, geographic region, and where received, 1976.
8. Sawlog production and receipts in the WESTERN REGION of Pennsylvania, by species and destination of shipment, 1976.
9. Sawlog production and receipts in the NORTH-CENTRAL REGION of Pennsylvania, by species and destination of shipment, 1976.
10. Sawlog production and receipts in the SOUTHWESTERN REGION of Pennsylvania, by species and destination of shipment, 1976.
11. Sawlog production and receipts in the NORTHEASTERN REGION of Pennsylvania, by species and destination of shipment, 1976.
12. Sawlog production and receipts in the SOUTHEASTERN REGION of Pennsylvania, by species and destination of shipment, 1976.
13. Sawlog production and receipts in the SOUTH-CENTRAL REGION of Pennsylvania, by species and destination of shipment, 1976.
14. Sawlog production and receipts in Pennsylvania, by species and destination of shipment, 1976.

OTHER PRODUCT STATISTICS

15. Pulpwood production in Pennsylvania, by species group, 1967-1976.
16. Pulpwood harvest in Pennsylvania, by species group and geographic region, 1967-1976.
17. Veneer log production in Pennsylvania, by species and consuming state, 1976.
18. Veneer log receipts in Pennsylvania, by species and producing state, 1976.
19. Production and distribution of manufacturing residues, by type of residue, use, and industry source, Pennsylvania, 1976.
20. Volume of unused sawmill residues, by geographic region, species group, and type of residue, Pennsylvania, 1976.

Bones, J. T., and J. K. Sherwood.
1979. **Pennsylvania timber industries—a periodic assessment of timber output.** Northeast. For. Exp. Stn., Broomall, Pa. 26 p., illus. (USDA For. Serv. Res. Bull. NE-59)

The result of a survey of the timber industries of Pennsylvania, this report contains statistics on industrial timber production and receipts, and production and disposition of the manufacturing residues. Comparisons are made with the most recent previous survey, and trends in industrial wood output are noted. Includes 20 statistical tables.

792:83(748)

Keywords: Timber output, wood residue use, Pennsylvania manufacturers, production statistics

Bones, J. T., and J. K. Sherwood.
1979. **Pennsylvania timber industries—a periodic assessment of timber output.** Northeast. For. Exp. Stn., Broomall, Pa. 26 p., illus. (USDA For. Serv. Res. Bull. NE-59)

The result of a survey of the timber industries of Pennsylvania, this report contains statistics on industrial timber production and receipts, and production and disposition of the manufacturing residues. Comparisons are made with the most recent previous survey, and trends in industrial wood output are noted. Includes 20 statistical tables.

792:83(748)

Keywords: Timber output, wood residue use, Pennsylvania manufacturers, production statistics

Bones, J. T., and J. K. Sherwood.
1979. **Pennsylvania timber industries—a periodic assessment of timber output.** Northeast. For. Exp. Stn., Broomall, Pa. 26 p., illus. (USDA For. Serv. Res. Bull. NE-59)

The result of a survey of the timber industries of Pennsylvania, this report contains statistics on industrial timber production and receipts, and production and disposition of the manufacturing residues. Comparisons are made with the most recent previous survey, and trends in industrial wood output are noted. Includes 20 statistical tables.

792:83(748)

Keywords: Timber output, wood residue use, Pennsylvania manufacturers, production statistics

Bones, J. T., and J. K. Sherwood.
1979. **Pennsylvania timber industries—a periodic assessment of timber output.** Northeast. For. Exp. Stn., Broomall, Pa. 26 p., illus. (USDA For. Serv. Res. Bull. NE-59)

The result of a survey of the timber industries of Pennsylvania, this report contains statistics on industrial timber production and receipts, and production and disposition of the manufacturing residues. Comparisons are made with the most recent previous survey, and trends in industrial wood output are noted. Includes 20 statistical tables.

792:83(748)

Keywords: Timber output, wood residue use, Pennsylvania manufacturers, production statistics

Table 1.—Volume of industrial timber, by product harvested, Pennsylvania, 1976

Product	Volume in standard units				Roundwood volume		
	Standard units	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
					Thousand cubic feet		
Sawlogs	M board feet[a]	644,158	52,846	591,312	103,703	8,715	94,988
Pulpwood	Standard cords	625,203	35,890	589,313	53,143	3,051	50,092
Veneer logs	M board feet[a]	14,739	—	14,739	2,073	—	2,073
Cooperage logs	M board feet[a]	4,224	—	4,224	538	—	538
Mine timbers	M cubic feet	4,561	163	4,398	4,561	163	4,398
Misc. products[b]	M cubic feet	2,036	125	1,911	2,036	125	1,911
Total	—	—	—	—	166,054	12,054	154,000

[a]International ¼-inch rule.
[b]Includes bat and handle stock, posts, charcoal wood and wood fiber products.

Table 2.—Change in timber products output in Pennsylvania between 1969 and 1976

Product	All species			Softwoods			Hardwoods		
	1969	1976	Change	1969	1976	Change	1969	1976	Change
	Million cubic feet		*Percent*	*Million cubic feet*		*Percent*	*Million cubic feet*		*Percent*
Sawlogs	87.5	103.7	+19	8.6	8.7	+ 1	78.9	95.0	+20
Pulpwood	49.7	53.2	+ 7	4.7	3.1	−34	45.0	50.1	+11
Veneer logs	2.1	2.1	(a)	—	—	—	2.1	2.1	—
Cooperage logs	1.2	.5	−58	—	—	—	1.2	.5	−58
Mine timbers	5.8	4.6	−21	.2	.2	(a)	5.6	4.4	−21
Misc. products[b]	2.6	2.0	−23	(c)	.1	—	2.6	1.9	−27
Total	148.9	166.1	+12	13.5	12.1	−10	135.4	154.0	+14

[a]Less than 0.5 percent.
[b]Includes handle and bat stock, posts, charcoal wood, and wood fiber products.
[c]Less than 50,000 cubic feet.

Table 3.—Industrial timber harvest[a] in Pennsylvania, by geographic region, species group, and product, 1976

(In thousands of cubic feet)

Region and species group	Sawlogs	Pulpwood	Other products[b]	All products
Western				
Softwoods	526	102	133	761
Hardwoods	14,832	426	4,648	19,906
Total	15,358	528	4,781	20,667
North-Central				
Softwoods	4,106	433	—	4,539
Hardwoods	35,539	29,699	1,486	66,724
Total	39,645	30,132	1,486	71,263
Southwestern				
Softwoods	1,159	1,054	30	2,243
Hardwoods	15,837	5,100	1,367	22,304
Total	16,996	6,154	1,397	24,547
Northeastern				
Softwoods	1,872	323	—	2,195
Hardwoods	8,306	9,639	761	18,706
Total	10,178	9,962	761	20,901
Southeastern				
Softwoods	169	451	125	745
Hardwoods	7,597	1,403	340	9,340
Total	7,766	1,854	465	10,085
South-Central				
Softwoods	883	688	—	1,571
Hardwoods	12,877	3,825	318	17,020
Total	13,760	4,513	318	18,591
All regions				
Softwoods	8,715	3,051	288	12,054
Hardwoods	94,988	50,092	8,920	154,000
Total	103,703	53,143	9,208	166,054

[a]Does not include fuelwood or removals that are not manufactured into industrial products.

[b]Includes cooperage and veneer logs, mine timbers, bat and handle stock, posts, charcoal wood, and wood fiber products.

Table 4.—Number of operating sawmills in Pennsylvania, by geographic region and annual production class,[a] 1964, 1969, and 1976

Region	Production class											
	Less than ½ million board feet			½ million to 1 million board feet			Over 1 million board feet			All classes		
	1964	1969	1976	1964	1969	1976	1964	1969	1976	1964	1969	1976
Western	86	56	60	27	19	25	26	19	30	139	94	115
North-Central	161	111	99	53	39	49	75	58	66	289	208	214
Southwestern	88	45	45	29	23	18	33	29	41	150	97	104
Northeastern	128	65	61	17	16	16	15	16	27	160	97	104
Southeastern	96	64	53	11	10	14	10	7	10	117	81	77
South-Central	108	61	70	28	25	24	8	21	32	144	107	126
All regions	667	402	388	165	132	146	167	150	206	999	684	740

[a]Based on sawlogs receipts or reported annual lumber production capacity.

Table 5.—Sawlog production and receipts relationships in Pennsylvania, by geographic region, between 1969 and 1976

Region	Production			Receipts		
	1969	1976	Change	1969	1976	Change
	Million board feet[a]	*Million board feet*[a]	*Percent*	*Million board feet*[a]	*Million board feet*[a]	*Percent*
Western	85.9	95.6	+11	81.9	90.6	+11
North-Central	192.4	246.2	+28	182.3	230.6	+26
Southwestern	97.7	105.6	+ 8	120.4	141.7	+18
Northeastern	58.3	63.0	+ 8	58.2	74.3	+28
Southeastern	41.0	48.3	+18	34.9	43.3	+24
South-Central	68.1	85.5	+26	70.0	90.2	+29
All regions	543.4	644.2	+19	547.7	670.7	+22

[a]International ¼-inch rule.

Table 6.—Sawlog production for Pennsylvania, by species group, geographic region, and where received, 1976

(In millions of board feet, International ¼-inch rule)

Species group and region	Where received			Total production
	Within region	Within state	In other states	
Softwoods				
Western	2.8	0.4	—	3.2
North-Central	22.2	2.7	—	24.9
Southwestern	6.7	.3	—	7.0
Northeastern	11.0	.3	—	11.3
Southeastern	.9	.1	—	1.0
South-Central	5.1	.3	—	5.4
All regions	48.7	4.1	—	52.8
Hardwoods				
Western	74.1	18.3	—	92.4
North-Central	197.9	23.1	0.3	221.3
Southwestern	96.5	.5	1.6	98.6
Northeastern	47.9	3.8	—	51.7
Southeastern	39.1	7.9	.3	47.3
South-Central	73.3	6.8	—	80.1
All regions	528.8	60.4	2.2	591.4
All species	577.5	64.5	2.2	644.2

Table 7.—Sawlog receipts for Pennsylvania, by species group, geographic region, and where produced, 1976

(In millions of board feet, International ¼-inch rule)

Species group and region	Where produced			Total receipts
	Within region	Within state	In other states	
Softwoods				
Western	2.8	1.1	—	3.9
North-Central	22.2	.3	0.3	22.8
Southwestern	6.7	1.0	(a)	7.7
Northeastern	11.0	1.1	.9	13.0
Southeastern	.9	.2	(a)	1.1
South-Central	5.1	.4	—	5.5
All regions	48.7	4.1	1.2	54.0
Hardwoods				
Western	74.1	11.0	1.6	86.7
North-Central	197.9	6.8	3.1	207.8
Southwestern	96.5	24.7	12.8	134.0
Northeastern	47.9	5.9	7.5	61.3
Southeastern	39.1	1.4	1.7	42.2
South-Central	73.3	10.6	.8	84.7
All regions	528.8	60.4	27.5	616.7
All species	577.5	64.5	28.7	670.7

[a]Less than 50,000 board feet.

Table 8.—Sawlog production and receipts in the WESTERN REGION of Pennsylvania, by species and destination of shipment, 1976

(In millions of board feet, International ¼-inch rule)

Species	Cut and retained in region	Out-shipments		Total production	In-shipments		Total receipts
		To other regions	To other states		From other regions	From other states	
Hemlock	2.3	0.3	—	2.6	0.7	—	3.0
White pine	.4	.1	—	.5	.4	—	.8
Other softwoods	.1	—	—	.1	—	—	.1
Total softwoods	2.8	0.4	—	3.2	1.1	—	3.9
Ash	3.6	0.4	—	4.0	1.0	0.4	5.0
Basswood	.8	.2	—	1.0	.1	(a)	.9
Beech	3.7	.3	—	4.0	.6	.3	4.6
Cherry	6.5	1.0	—	7.5	1.9	.1	8.5
Elm	.9	.3	—	1.2	(a)	.1	1.0
Hickory	1.3	.2	—	1.5	.1	.1	1.5
Hard maple	9.0	1.3	—	10.3	1.4	.4	10.8
Soft maple	6.7	.9	—	7.6	1.3	(a)	8.0
White oak	5.3	1.0	—	6.3	.7	(a)	6.0
Chestnut oak	2.1	.7	—	2.8	.1	—	2.2
Red and black oak	22.6	8.3	—	30.9	2.8	.1	25.5
Scarlet and pin oak	3.0	.7	—	3.7	.3	—	3.3
Yellow-poplar	7.0	2.6	—	9.6	.3	.1	7.4
Other hardwood[b]	1.6	.4	—	2.0	.4	(a)	2.0
Total hardwoods	74.1	18.3	—	92.4	11.0	1.6	86.7
All species	76.9	18.7	—	95.6	12.1	1.6	90.6

[a] Less than 50,000 board feet.

[b] Includes aspen, black walnut, yellow and black birch.

Table 9.—Sawlog production and receipts in the NORTH-CENTRAL REGION of Pennsylvania, by species and destination of shipment, 1976

(In millions of board feet, International ¼-inch rule)

Species	Cut and retained in region	Out-shipments		Total production	In-shipments		Total receipts
		To other regions	To other states		From other regions	From other states	
Hemlock	13.5	1.8	—	15.3	0.2	0.1	13.8
White pine	8.2	.9	—	9.1	.1	.2	8.5
Other softwoods	.5	(a)	—	.5	—	(a)	.5
Total softwoods	22.2	2.7	—	24.9	0.3	0.3	22.8
Ash	4.6	1.2	(a)	5.8	0.2	(a)	4.8
Aspen	1.0	.2	—	1.2	(a)	0.1	1.1
Basswood	3.1	.8	(a)	3.9	.2	.1	3.4
Beech	9.9	1.3	0.1	11.3	.2	.1	10.2
Yellow and black birch	1.8	.1	(a)	1.9	.1	(a)	1.9
Cherry	38.8	3.1	.1	42.0	.6	.1	39.5
Hard maple	18.2	2.7	(a)	20.9	1.2	1.0	20.4
Soft maple	28.0	2.9	(a)	30.9	.8	.3	29.1
White oak	15.1	1.9	.1	17.1	.5	.1	15.7
Chestnut oak	6.2	1.0	—	7.2	.7	—	6.9
Red and black oak	59.0	6.3	—	65.3	1.9	.8	61.7
Scarlet and pin oak	6.3	.6	—	6.9	.1	(a)	6.4
Yellow-poplar	3.9	.6	—	4.5	.1	(a)	4.0
Other hardwoods[b]	2.0	.4	—	2.4	.2	.5	2.7
Total hardwoods	197.9	23.1	0.3	221.3	6.8	3.1	207.8
All species	220.1	25.8	0.3	246.2	7.1	3.4	230.6

[a] Less than 50,000 board feet.

[b] Includes elm, hickory, and black walnut.

Table 10.—Sawlog production and receipts in the SOUTHWESTERN REGION of Pennsylvania, by species and destination of shipment, 1976

(In millions of board feet, International ¼-inch rule)

Species	Cut and retained in region	Out-shipments		Total production	In-shipments		Total receipts
		To other regions	To other states		From other regions	From other states	
Hemlock	3.6	0.1	—	3.7	0.5	(a)	4.1
White pine	2.2	.2	—	2.4	.5	(a)	2.7
Other softwoods	.9	—	—	.9	(a)	—	.9
Total softwoods	6.7	0.3	—	7.0	1.0	(a)	7.7
Ash	1.9	(a)	—	1.9	0.7	0.3	2.9
Basswood	1.4	—	0.1	1.5	.2	(a)	1.6
Beech	2.5	(a)	.1	2.6	.4	(a)	2.9
Cherry	10.3	(a)	—	10.3	1.4	.1	11.8
Hickory	1.6	(a)	.1	1.7	.2	(a)	1.8
Hard maple	7.0	(a)	.2	7.2	.7	.1	7.8
Soft maple	7.4	(a)	.1	7.5	1.1	.2	8.7
White oak	10.1	(a)	.2	10.3	2.1	.7	12.9
Chestnut oak	6.6	.1	.2	6.9	.9	.2	7.7
Red and black oak	36.5	.2	.4	37.1	11.7	3.0	51.2
Scarlet and pin oak	4.4	.1	.1	4.6	1.0	(a)	5.4
Yellow-poplar	5.7	.1	(a)	5.8	2.9	(a)	8.6
Black walnut	.2	—	.1	.3	.8	.5	1.5
Other hardwoods[b]	.9	—	—	.9	.6	7.7	9.2
Total hardwoods	96.5	0.5	1.6	98.6	24.7	12.8	134.0
All species	103.2	0.8	1.6	105.6	25.7	12.8	141.7

[a] Less than 50,000 board feet.

[b] Includes aspen, black and yellow birch, and elm.

Table 11.—Sawlog production and receipts in the NORTHEASTERN REGION of Pennsylvania, by species and destination of shipment, 1976

(In millions of board feet, International ¼-inch rule)

Species	Cut and retained in region	Out-shipments		Total production	In-shipments		Total receipts
		To other regions	To other states		From other regions	From other states	
Hemlock	6.4	0.1	—	6.5	0.8	0.6	7.8
White pine	4.5	.2	—	4.7	.3	.3	5.1
Other softwoods	.1	—	—	.1	—	—	.1
Total softwoods	11.0	0.3	—	11.3	1.1	0.9	13.0
Ash	1.6	0.1	—	1.7	(a)	0.2	1.8
Basswood	1.6	.1	—	1.7	0.4	.5	2.5
Beech	3.2	.1	—	3.3	.6	.8	4.6
Cherry	3.0	.3	—	3.3	.6	.4	4.0
Hard maple	6.3	.2	—	6.5	1.0	1.0	8.3
Soft maple	4.6	.4	—	5.0	.9	.5	6.0
White oak	4.8	.4	—	5.2	.3	1.1	6.2
Chestnut oak	3.9	.8	—	4.7	.2	.4	4.5
Red and black oak	14.1	1.2	—	15.3	1.6	2.5	18.2
Scarlet and pin oak	1.5	(a)	—	1.5	.1	.1	1.7
Yellow-poplar	1.4	.1	—	1.5	.1	(a)	1.5
Other hardwoods[b]	1.9	.1	—	2.0	.1	—	2.0
Total hardwoods	47.9	3.8	—	51.7	5.9	7.5	61.3
All species	58.9	4.1	—	63.0	7.0	8.4	74.3

[a] Less than 50,000 board feet.

[b] Includes aspen, elm, hickory, black walnut, yellow and black birch.

Table 12.—Sawlog production and receipts in the SOUTHEASTERN REGION of Pennsylvania, by species and destination of shipment, 1976

(In millions of board feet, International ¼-inch rule)

Species	Cut and retained in region	Out-shipments		Total production	In-shipments		Total receipts
		To other regions	To other states		From other regions	From other states	
Hemlock	0.3	(a)	—	0.3	0.1	—	0.4
White pine	.5	0.1	—	.6	.1	—	.6
Other softwoods	.1	—	—	.1	—	(a)	.1
Total softwoods	0.9	0.1	—	1.0	0.2	(a)	1.1
Ash	0.9	0.1	(a)	1.0	(a)	(a)	0.9
Beech	.3	—	(a)	.3	—	(a)	.3
Yellow and black birch	.2	—	—	.2	(a)	(a)	.2
Cherry	.1	—	—	.1	(a)	—	.1
Elm	.1	(a)	—	.1	(a)	—	.1
Hickory	1.3	.3	—	1.6	0.1	0.1	1.5
Hard maple	.1	.2	—	.3	—	—	.1
Soft maple	.7	.3	—	1.0	.1	(a)	.8
White oak	3.4	1.2	0.1	4.7	.2	.1	3.7
Chestnut oak	2.7	1.9	—	4.6	.2	.2	3.1
Red and black oak	15.8	1.6	.1	17.5	.5	.7	17.0
Scarlet and pin oak	2.1	1.7	—	3.8	.1	.2	2.4
Yellow-poplar	10.9	.3	.1	11.3	.2	.4	11.5
Black walnut	.2	.3	—	.5	(a)	—	.2
Other hardwoods[b]	.3	—	(a)	.3	—	(a)	.3
Total hardwoods	39.1	7.9	0.3	47.3	1.4	1.7	42.2
All species	40.0	8.0	0.3	48.3	1.6	1.7	43.3

[a] Less than 50,000 board feet.

[b] Includes aspen and basswood.

Table 13.—Sawlog production and receipts in the SOUTH-CENTRAL REGION of Pennsylvania, by species and destination of shipment, 1976

(In millions of board feet, International ¼-inch rule)

Species	Cut and retained in region	Out-shipments		Total production	In-shipments		Total receipts
		To other regions	To other states		From other regions	From other states	
Hemlock	1.2	0.1	—	1.3	0.1	—	1.3
White pine	3.3	.2	—	3.5	.3	—	3.6
Other softwoods	.6	—	—	.6	(a)	—	.6
Total softwoods	5.1	0.3	—	5.4	0.4	—	5.5
Ash	0.7	0.2	—	0.9	0.1	—	0.8
Aspen	.2	—	—	.2	—	—	.2
Basswood	.4	(a)	—	.4	(a)	—	.4
Cherry	(a)	.1	—	.1	—	—	(a)
Elm	.1	(a)	—	.1	(a)	—	.1
Hickory	2.1	.1	—	2.2	.3	(a)	2.4
Hard maple	.7	.1	—	.8	.2	—	.9
Soft maple	1.7	.1	—	1.8	.4	—	2.1
White oak	12.4	1.0	—	13.4	1.7	(a)	14.1
Chestnut oak	16.3	.5	—	16.8	2.9	0.1	19.3
Red and Black oak	29.3	3.7	—	33.0	2.8	.5	32.6
Scarlet and pin oak	5.5	.3	—	5.8	1.8	.1	7.4
Yellow-poplar	3.6	.3	—	3.9	.4	.1	4.1
Black walnut	.1	.4	—	.5	(a)	—	.1
Other hardwoods[b]	.2	(a)	—	.2	—	—	.2
Total hardwoods	73.3	6.8	—	80.1	10.6	0.8	84.7
All species	78.4	7.1	—	85.5	11.0	0.8	90.2

[a] Less than 50,000 board feet.

[b] Includes beech, and black and yellow birch.

Table 14. Sawlog production and receipts in Pennsylvania, by species and destination of shipment, 1976

(In millions of board feet, International ¼-inch rule)

Species	Cut and retained in state	Exported to			Total production	Imported from			Total receipts
		Maryland	New York	West Virginia		New York	West Virginia	Other states[b]	
Hemlock	29.7	—	—	—	29.7	0.7	—	(a)	30.4
White pine	20.8	—	—	—	20.8	.5	—	(a)	21.3
Other softwoods	2.3	—	—	—	2.3	(a)	—	(a)	2.3
Total softwoods	52.8	—	—	—	52.8	1.2	—	(a)	54.0
Ash	15.3	—	—	—	15.3	0.6	0.1	0.2	16.2
Basswood	8.4	—	—	0.1	8.5	.7	—	(a)	9.1
Beech	21.3	—	—	.2	21.5	1.1	(a)	.1	22.5
Cherry	63.2	—	0.1	—	63.3	.5	(a)	.2	63:9
Elm	2.3	—	—	—	2.3	—	—	.1	2.4
Hickory	8.1	—	—	.1	8.2	(a)	(a)	.2	8.3
Hard maple	45.8	—	—	.2	46.0	2.3	.1	.1	48.3
Soft maple	53.7	—	—	.1	53.8	.8	.1	.1	54.7
White oak	56.6	0.1	.1	.2	57.0	.9	.3	.8	58.6
Chestnut oak	42.8	—	—	.2	43.0	.3	.2	.4	43.7
Red and black oak	198.6	.1	—	.4	199.1	2.6	2.2	2.8	206.2
Scarlet and pin oak	26.2	—	—	.1	26.3	(a)	.1	.3	26.6
Yellow-poplar	36.5	.1	—	—	36.6	(a)	.1	.5	37.1
Other hardwoods[c]	10.4	—	—	.1	10.5	.5	7.9	.3	19.1
Total hardwoods	589.2	0.3	0.2	1.7	591.4	10.3	11.1	6.1	616.7
All species	642.0	0.3	0.2	1.7	644.2	11.5	11.1	6.1	670.7

[a] Less than 50,000 board feet.

[b] Includes Maryland, New Jersey, and Ohio.

[c] Includes aspen, yellow and black birch, and black walnut.

Table 15.—Pulpwood production in Pennsylvania, by species group, 1967-1976[a]

(In thousands of rough cords)

Year	All species	Softwoods	Hardwoods
1967	754.8	87.4	667.4
1968	685.8	69.8	616.0
1969	806.1	66.7	739.4
1970	777.4	58.2	719.2
1971	775.1	43.7	731.4
5-year total	3,799.2	325.8	3,473.4
1972	788.5	38.3	750.2
1973	952.4	46.0	906.4
1974	1,008.6	48.5	960.1
1975	783.1	41.7	741.4
1976	909.5	56.2	853.3
5-year total	4,442.1	230.7	4,211.4

[a]Includes production from roundwood and manufacturing residues.

Table 16.—Pulpwood harvest in Pennsylvania, by species group and geographic region, 1967-1976

(In thousands of rough cords)

Species group and region	Pulpwood harvest in:										All years
	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	
Softwoods											
Western	0.9	0.4	1.8	2.2	1.5	0.7	2.4	0.5	1.3	1.2	12.9
Southwestern	13.7	11.7	10.2	6.6	8.8	8.2	8.7	9.2	10.0	12.4	99.5
North-Central	26.5	25.0	16.7	17.5	8.9	6.6	4.9	7.9	4.8	5.1	123.9
South-Central	35.2	22.1	25.0	18.8	12.7	9.5	11.4	10.5	7.9	8.1	161.2
Northeastern	6.6	2.6	1.3	2.4	1.0	1.2	.6	.5	.1	3.8	20.1
Southeastern	1.6	2.6	4.2	1.8	1.8	1.3	3.1	4.1	5.4	5.3	31.2
All regions	84.5	64.4	59.2	49.3	34.7	27.5	31.1	32.7	29.5	35.9	448.8
Hardwoods											
Western	12.2	12.6	13.0	9.8	12.9	13.7	11.0	9.6	19.9	5.0	119.7
Southwestern	89.4	88.1	71.8	56.0	63.6	59.6	66.2	67.4	60.5	60.0	682.6
North-Central	249.5	219.7	297.2	322.1	291.6	312.2	415.6	404.1	286.8	349.4	3,148.2
South-Central	128.5	79.4	85.0	69.5	55.4	44.9	57.3	54.4	39.4	45.0	658.8
Northeastern	48.5	38.9	72.8	81.5	111.2	98.3	111.2	117.3	88.9	113.4	882.0
Southeastern	18.2	23.8	22.9	18.9	16.3	10.0	16.9	14.3	14.0	16.5	171.8
All regions	546.3	462.5	562.7	557.8	551.0	538.7	678.2	667.1	509.5	589.3	5,663.1
All species	630.8	526.8	621.9	607.1	585.7	566.2	709.3	699.8	539.0	625.2	6,111.9

Table 17.—Veneer-log production in Pennsylvania, by species and consuming state, 1976
(In thousands of board feet, International ¼-inch rule)

Species	Cut and retained in Pennsylvania	Exported to:						Total production
		Maryland	West Virginia	Indiana	North Carolina	Virginia	Other states[a]	
Ash	—	38	14	221	23	297	67	660
Beech	38	—	—	—	—	—	—	38
Cherry	134	—	781	447	23	1,245	605	3,235
Hickory	513	—	13	—	—	—	—	526
Hard maple	—	57	—	—	—	—	—	57
Black oak	—	—	175	—	—	—	—	175
Red oak	5,635	38	906	—	23	204	1,161	7,967
White oak	152	246	138	294	—	310	192	1,332
Yellow-poplar	93	37	—	—	391	—	190	711
Other species[b]	7	6	—	15	—	—	10	38
All species	6,572	422	2,027	977	460	2,056	2,225	14,739

[a]Includes Iowa, Kentucky, New York, Tennessee, New Jersey, and Ontario, Canada.
[b]Includes basswood, elm, yellow birch, soft maple, and walnut.

Table 18.—Veneer-log receipts in Pennsylvania, by species and producing state, 1976
(In thousands of board feet, International ¼-inch rule)

Species	Cut and retained in Pennsylvania	Imports from:					Total receipts
		Maryland	New Jersey	New York	West Virginia	Other states[a]	
Beech	38	—	—	6	—	6	50
Yellow birch	7	—	—	2	—	—	9
Cherry	134	1	—	—	—	—	135
Hickory	513	133	10	12	468	69	1,205
Red oak	5,635	767	386	285	1,838	2	8,913
White oak	152	25	30	—	7	—	214
Yellow-poplar	93	18	31	—	—	3	145
All species	6,572	944	457	305	2,313	80	10,671

[a]Includes Ohio, North Carolina, Virginia.

Table 19.—Production and distribution of manufacturing residues, by type of residue, use, and industry source, Pennsylvania, 1976

(In thousands of cubic feet)

Source industry	Use	Type of residue			All types
		Bark	Coarse[a]	Fine[b]	
Lumber	Fiber	—	22,235	433	22,668
	Fuel[c]	2,473	6,197	1,950	10,620
	Agricultural[d]	1,237	—	13,429	14,666
	Other	5,069	1,461	1,082	7,612
	All uses	8,779	29,893	16,894	55,566
	Unused	3,587	6,559	4,765	14,911
Veneer	Fiber	—	—	—	—
	Fuel	69	323	470	862
	Agricultural	129	—	25	154
	Other	—	7	—	7
	All uses	198	330	495	1,023
	Unused	—	—	—	—
Other industries	Fiber	—	452	—	452
	Fuel	105	389	45	539
	Agricultural	9	—	240	249
	Other	100	10	—	110
	All uses	214	851	285	1,350
	Unused	53	117	96	266
All industries[e]	Fiber	—	22,687	433	23,120
	Fuel	2,647	6,909	2,465	12,021
	Agricultural	1,375	—	13,694	15,069
	Other	5,169	1,478	1,082	7,729
	All uses	9,191	31,074	17,674	57,939
	Unused	3,640	6,676	4,861	15,177

[a]Includes slabs, edgings, trimmings, veneer cores, and other material suitable for chipping.
[b]Includes sawdust, shavings, and other material considered unsuitable for chipping.
[c]Includes both domestic and industrial fuel.
[d]Includes livestock bedding and farm and horticultural mulch.
[e]Excludes the woodpulp industry.

Table 20.—Volume of unused sawmill residues, by geographic region, species group, and type of residue, Pennsylvania, 1976

(In thousands of cubic feet)

Region	All species			Softwoods			Hardwoods		
	Bark	Fine	Coarse	Bark	Fine	Coarse	Bark	Fine	Coarse
Western	466	943	813	31	31	27	450	912	786
North-Central	1,598	1,656	2,923	162	167	296	1,436	1,489	2,627
Southwestern	1,026	1,178	1,683	68	78	112	958	1,100	1,571
Northeastern	284	347	230	51	62	41	233	285	189
Southeastern	8	131	38	—	3	1	8	128	37
South-Central	205	510	872	13	32	55	192	478	817
All units	3,587	4,765	6,559	310	373	532	3,277	4,392	6,027

☆U.S. GOVERNMENT PRINTING OFFICE: 1979—603-011/16

Headquarters of the Northeastern Forest Experiment Station are in Broomall, Pa. Field laboratories and research units are maintained at:

- Beltsville, Maryland.
- Berea, Kentucky, in cooperation with Berea College.
- Burlington, Vermont, in cooperation with the University of Vermont.
- Delaware, Ohio.
- Durham, New Hampshire, in cooperation with the University of New Hampshire.
- Hamden, Connecticut, in cooperation with Yale University.
- Kingston, Pennsylvania.
- Morgantown, West Virginia, in cooperation with West Virginia University, Morgantown.
- Orono, Maine, in cooperation with the University of Maine, Orono.
- Parsons, West Virginia.
- Princeton, West Virginia.
- Syracuse, New York, in cooperation with the State University of New York College of Environmental Sciences and Forestry at Syracuse University, Syracuse.
- University Park, Pennsylvania.
- Warren, Pennsylvania.

by Robert L. Nevel, Jr. and David R. Dickson

CLEMSON UNIVERSITY LIBRARY
JUN 19 1979
SCI., TECH. & AGRIC. DIV.

NORTHEASTERN PULPWOOD, 1977—
AN ANNUAL ASSESSMENT OF REGIONAL TIMBER OUTPUT

GOVT. DOCUMENTS
DEPOSITORY ITEM
CLEMSON

USDA FOREST SERVICE RESOURCE BULLETIN NE-60
1979
FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE
NORTHEASTERN FOREST EXPERIMENT STATION
370 REED ROAD, BROOMALL, PA. 19008

The Authors

ROBERT L. NEVEL, JR., forester, received a bachelor's degree in forest technology from The Pennsylvania State University in 1965 and a master's degree in wood technology from Yale University in 1968. He joined the Northeastern Forest Experiment Station's Forestry Sciences Laboratory at Princeton, West Virginia, in 1968, where he was engaged in research on the economic efficiency of hardwood resources use in secondary manufactured products. In June 1978, he joined the Northeastern Station at Broomall, Pennsylvania, where he is working in the timber-removals phase of Forest Resources Evaluation.

DAVID R. DICKSON, research forester, received his bachelor's degree in forestry from the University of New Hampshire in 1954, and then joined the Lake States Forest Experiment Station. He joined the Northeastern Forest Experiment Station in 1957, and worked on many aspects of the forest survey. He is now responsible for operation of the data-processing system for compiling and analyzing data from the many resource studies of the Resources Evaluation work unit.

MANUSCRIPT RECEIVED FOR PUBLICATION 15 JANUARY 1979

Cover Photo

Although rail operations like this one in South Central Maine are common throughout the Northeast, the proportion of roundwood pulpwood delivered by rail is declining. Despite increased production of both roundwood and wood chips and the cessation of stream-driving, the volume of roundwood shipments by rail have remained relatively constant over the last 5 years. Projection of these trends means more pulpwood will be delivered by truck.

NORTHEASTERN PULPWOOD, 1977—
AN ANNUAL ASSESSMENT OF REGIONAL TIMBER OUTPUT

CONTENTS

BACKGROUND 1
PULPWOOD PRODUCTION CONTINUES TO RISE 1
PRODUCTION FROM ROUNDWOOD UP BY 4 PERCENT 3
NINETEEN COUNTIES TOP 50-THOUSAND-CORD MARK 3
TOTAL-TREE UTILIZATION 4
ROUNDWOOD HARVEST RELATED TO GROWING-STOCK INVENTORY 5
WOOD CHIP PRODUCTION ROSE BY 29 PERCENT TO RECORD HIGH 6
APPENDIX 6
INDEX TO TABLES 12

Abstract

This annual assessment of regional timber output is based on a canvass of the pulpmills in the Northeast that use roundwood or wood residue as a basic raw material for paper, insulation, and hardboard products. The report includes a discussion and tabular data on roundwood and chips from plant residues produced in and received by 14 northeastern states in 1977: pulpwood production by state, county, and species group; pulpwood receipts from roundwood by state and species group; pulpwood chip receipts by state and species group; and production of total-tree chips. From 1976 to 1977, pulpwood production increased by 10 percent; roundwood production rose by 4 percent; and chipped residue production jumped by 29 percent. Current record levels are discussed and trends in pulpwood production for the past 15 years are illustrated. A list of the woodpulp mills that received northeastern pulpwood during 1977 is included.

BACKGROUND

THIS ANNUAL REPORT is based on a canvass of all pulpmills in the Northeast that use roundwood or wood residue as a basic raw material for paper, insulation, and hardboard products. Cross-boundary shipments are traced by exchanging information with neighboring experiment stations that conduct similar canvasses.

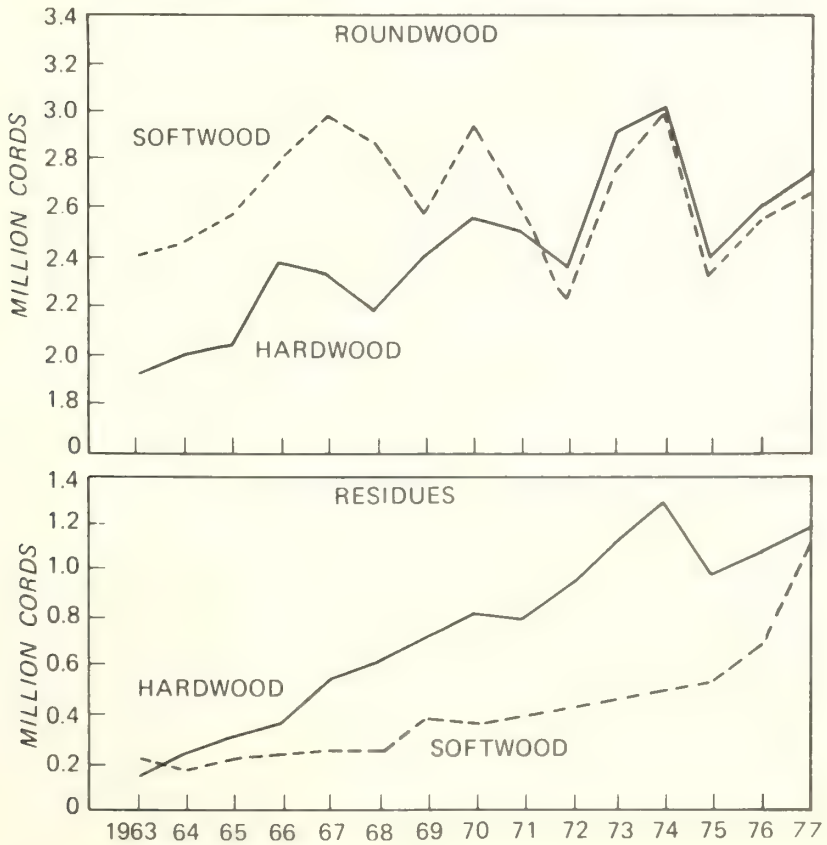
The statistics for production from roundwood are based on mill receipts, which are subject to year-to-year fluctuations in wood inventory. Most plant residues are received at the pulpmill in chip form. Mill receipts of pulpwood from roundwood are reported by county where harvested. However, pulpwood from plant residue can be traced only to the state where the residue was produced. Some of the logs from which the residue came were probably harvested in states other than the one in which they were processed.

PULPWOOD PRODUCTION CONTINUES TO RISE

During 1977, pulpwood production in 14 northeastern states (Connecticut, Delaware, Kentucky, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, and West Virginia) rose 10 percent above the previous year's total, from 6,946,900 cords to the 7,668,200 cords shown in Table 1. This increase was a continuation of the recovery that began in 1976 after the decline of 1975 (Fig. 1). Total production for 1977 was only slightly less than the record high 7,760,600 cords reported in 1974.

This was the result of increased production of hardwood and softwood roundwood and

Figure 1.—Pulpwood production for Northeastern States, by year and source of wood.



chips from plant residues. As in 1976, softwood chip production from manufacturing residues increased more than the other components of total production; and the 59-percent rise was responsible for most of the increase in both total chip production and total pulpwood production. Chipped hardwood residue rose by 10 percent; and hardwood, softwood, and total roundwood production each increased by about 4 percent since 1976.

As in 1976, woodyard inventories declined during the first half of the year; pulpmills operated at relatively constant near-capacity rates; pulpwood consumption exceeded receipts; and year-end inventories were at their lowest levels in 3 years. High pulpwood consumption continued throughout the year and inventories rose somewhat during the last half of the year, although erratically, as receipts generally exceeded consumption.

For the sixth consecutive year, hardwood roundwood production was greater than softwood, but by only 93,200 cords. Each accounted for about 35 percent of the total pulpwood production. For the first time in over 10 years, chipped residue production was divided almost equally between hardwood and softwood. Total production of chips from plant residue increased 518,100 cords and softwood residue increased 408,900 cords over 1976 production. In 1977, softwood chip production was only 85,000 cords less than that from hardwood residue. Since both roundwood and chip production were about equally divided between hardwoods and softwoods, so was total production. Hardwoods accounted for 51 percent of all pulpwood produced in 1977, down by 2 percent from 1976.

Thus, while production of pulpwood rose by 10 percent, receipts of pulpwood at woodpulp mills in the Northeast totaled 8,417,800 cords in 1977, up by 12 percent over the previous year. Despite these increases, the pulpwood receipts were 44,900 cords less than the record high reported in 1974. The 1977 receipts include wood harvested in the Northeast and pulpwood imported from other regions. For the first time since 1970, softwood receipts exceeded hardwood. Softwood receipts increased by 19 percent over 1976 to exceed those for hardwoods by 119,000 cords. Total receipts exceeded total production by 749,600 cords (Table 2).

Six of the 14 northeastern states (Connecticut, Delaware, Massachusetts, New York, Vermont, and West Virginia) produced more wood than they received. Delaware, Massachusetts, and West Virginia had no operating woodpulp mills, so all of their production was shipped to other states. Vermont and Connecticut each had one operating pulpmill. Pulpwood production decreased in only four of the northeastern states:

Delaware	−14%
Kentucky	−10%
Pennsylvania	− 5%
West Virginia	− 5%

Although slight, this was the fourth straight decline in production for West Virginia. After a slight decline in 1976, production in New Hampshire increased by 52 percent to a record high the following year. Production also increased significantly (36 percent) in Vermont for a record high in this state also, but remained constant in Rhode Island. Total pulpwood receipts increased in all but two states, Rhode Island and Vermont, where the decrease was less than 10 percent. Receipts increased by more than 10 percent in only three states:

Maine	+11%
New Hampshire	+82%
Ohio	+20%

The increase in receipts for New Hampshire was brought about by increases in both softwood and hardwood pulpwood shipped into the state. Softwood receipts almost tripled from 56,800 to 155,300 cords, while hardwood rose to 402,800 cords, 62 percent over 1976. About half of the softwood receipts were from plant residue; almost all of the hardwood receipts were roundwood.

In recent years, there has been a decrease in the use of Canadian softwood and an increase in the use of pulpwood from areas outside the Northeast. In 1977, 1,104,900 cords of pulpwood came into the Northeast, an increase of 87,700 cords, or about 10 percent over 1976. This volume represents 12 percent of the region's total receipts for each of these 2 years. Only 31 percent of the pulpwood

shipped into the Northeast came from Canada; 49 percent came from southern states; and 20 percent came from the north-central states:

Region	Round-wood	Residues	All pulpwood
Canada	36%	26%	31%
Southern U.S.	55%	42%	49%
North-Central U.S.	9%	32%	20%

For the first time, southern roundwood made up over half of the roundwood imported into the Northeast; up from 44 percent in 1976. The volume of softwood imports increased and the volume of hardwood decreased. The proportion of softwood roundwood to hardwood roundwood imports almost doubled to 3.4 to 1. Although the volume of hardwood chip imports in 1977 still exceeded that for softwoods, the ratio decreased slightly to 1.5:1 as more softwood chipped residue was imported into the region.

PRODUCTION FROM ROUNDWOOD UP BY 4 PERCENT

The production of pulpwood from roundwood increased only 203,200 cords—or 4 percent—from 1976. The 5,377,000 cords of roundwood produced in 1977 represents a continuance of the incremental climb that began in 1972 and was interrupted by the economic slowdown in 1975. Annual roundwood production has exceeded 5 million cords for the ninth time beginning in 1966.

From 1976 to 1977, pulpwood production from roundwood increased in 8 of the 14 states. Roundwood production rose by more than 25 percent to record levels in New Hampshire (+87 percent or 350,400 cords) and in Vermont (+28 percent or 219,400 cords). These large increases in roundwood production account for most of the increase in total pulpwood production for these states.

Roundwood production was essentially unchanged for Maine, where just over one-half of all the northeast's roundwood was harvested. Pulpwood production from roundwood was down from 1976 in four states:

Delaware	−19%
Kentucky	−10%
Pennsylvania	− 9%
West Virginia	−13%

In West Virginia the decline in roundwood production has continued since 1975, with a record low of 185,900 cords produced for the state.

NINETEEN COUNTIES TOP 50-THOUSAND-CORD MARK

More than 50,000 cords of roundwood pulpwood were produced in each of 19 counties in 6 states in 1977, 1 county less than for 1976. Almost 3.5 million cords of roundwood were harvested from these counties, representing 65 percent of the total roundwood production for the Northeast.

For the first time since 1973, production did not exceed 50,000 cords in any county in West Virginia as a result of the continued decline in the state's harvest. Production in one county in Ohio exceeded 50,000 cords for the first time. Production in New Hampshire exceeded 50,000 cords in two counties for the first time, which was about one and a half times the production for the entire state the preceding year. New York was also represented by an additional county, for a total of six. Bedford County, Pennsylvania, was added to the list, while Lycoming was dropped. Maine continued to dominate the high-producer list with eight counties, three less than in 1976. For the first time, production in Oxford County, Maine, was greater than in Penobscot County, where the annual harvest has decreased since 1974. Counties that produced more than 50,000 cords of roundwood pulpwood in 1977 and their production totals are:

County	Production (thousand cords)
Aroostook Co., Maine	626.1
Piscataquis, Co., Maine	493.6
Somerset Co., Maine	439.9
Washington Co., Maine	287.6
Oxford Co., Maine	255.5
Penobscot Co., Maine	231.0
Coos Co., New Hampshire	217.1
Franklin Co., Maine	142.3
Essex Co., Vermont	115.8
Essex Co., New York	93.5
Carroll Co., New Hampshire	84.4
Franklin Co., New York	71.6
Saratoga Co., New York	67.7
Hamilton Co., New York	66.1
Kennebec Co., Maine	63.5
Warren Co., New York	59.7
St. Lawrence Co., New York	56.6
Vinton Co., Ohio	56.5
Bedford Co., Pennsylvania	50.3

TOTAL-TREE UTILIZATION

Harvesting and chipping the entire aboveground portion of the tree continue to be acceptable practices in portions of the Northeast. This system, which utilizes unbarked bolewood and topwood and leaves, produces brown chips. As the costs of labor and pulpwood continue to rise, the system is an attractive alternative to conventional methods where the use of brown chips is acceptable. Most total- or whole-tree chips produced in the region are used to produce kraft pulp from hardwoods.

The output of total-tree chips declined in the Northeast from 1976 to 1977:

	1976 (thousand cords)	1977 (thousand cords)	Change (percent)
Kentucky	0	3.2	[a]
Maine	179.3	142.5[c]	− 21
Maryland	8.3	5.7	− 31
New Hampshire	35.6	97.8	[b]
New Jersey	0.6	0	−100
New York	11.6	18.4	+ 59
Ohio	147.6	132.4	− 10
Pennsylvania	35.1	6.6	− 81
Vermont	30.8	34.9	+ 13
West Virginia	23.5	9.0	− 62
Total	472.4	450.4	− 5

[a]No output in 1976.
[b]Greater than 100 percent change.
[c]Includes all forms of brown, unbarked chips, such as bole- and tree-length material.

In 1977, the total-tree chip output decreased by 5 percent from 1976 after doubling between 1974 and 1976, which indicates that output may have leveled off. Since 1976, output increased in three states and decreased in six. Nine of the 10 states listed produced total-tree chips in 1977—the same number as in 1976. Kentucky was added to the list and New Jersey showed no output for 1977. In Ohio and Maine, where the use of total-tree chips for woodpulp was pioneered, production decreased. Although the output for Ohio decreased by 10 percent in 1977, the 132,400 cords comprised almost half of the total roundwood production and almost one-third of the total pulpwood production in Ohio—more than that for any other state. In Maine 142,500 cords were produced, but this represents only 5 percent of the total roundwood harvest for that State. Production from total-tree chips exceeded 5 percent of the total roundwood in Vermont and New Hampshire. Production of 34,900 cords in Vermont accounted for 16 percent of the total roundwood harvest for the state. In New Hampshire, production increased almost threefold within a year to 97,800 cords, which accounted for 28 percent of the State's total roundwood harvest in 1977.

ROUNDWOOD HARVEST RELATED TO GROWING-STOCK INVENTORY

While Figures 3, 4, and 5 show the total roundwood harvest by production class and county in the Northeast, they do not relate the volume harvested to the growing-stock volume. Growing-stock volume is the net volume in cubic feet of sound live trees of commercial species 5.0 inches in diameter at breast height (dbh) or larger, from a 1-foot stump to a minimum 4.0-inch top diameter outside bark of the central bole, or to the point where the bole breaks into limbs. To determine harvesting intensity, growing-stock volumes were taken from the 1977 Forest Statistics of the United States.

Harvesting intensities for softwoods and hardwoods in thousand cubic feet of growing stock present for each cord of pulpwood harvested in 1977 were:

Softwoods

Delaware	5.4
Maryland	6.6
Maine	8.3
New Jersey	10.0
Average	12.3
New York	17.9
Vermont	19.5
West Virginia	28.5
Ohio	30.6
New Hampshire	34.7
Pennsylvania	63.9
Connecticut	92.4
Kentucky	115.9
Rhode Island	134.9
Massachusetts	159.9

Hardwoods

Maine	7.8
New Hampshire	15.1
Ohio	16.2
New York	23.0
Vermont	25.2
Average	30.8
Pennsylvania	41.9
Maryland	46.3
West Virginia	88.5
Delaware	120.0
Rhode Island	160.0
Kentucky	201.3
New Jersey	1,282.1
Connecticut	1,316.1
Massachusetts	1,636.2

The states have been ranked (top to bottom) from the state in which the roundwood harvest was most intensive to the state in which the harvest was least intensive. These rankings and the regional averages should not be viewed as an index or standard for harvesting, but simply as a means of directing individuals engaged in pulpwood procurement from several alternative areas toward the most promising one.

On the average, in 1977 there were 12,300 cubic feet of softwood growing stock and 30,800 cubic feet of hardwood growing stock for each cord of pulpwood harvested in the Northeast. Harvesting intensity for softwoods was greater than the regional average in four states: Delaware, Maryland, Maine, and New Jersey. The hardwood harvest was more intensive than the regional average in five states: Maine, New Hampshire, Ohio, New York, and Vermont. Harvesting intensity was relatively low in the urbanized states and in those states that had no pulpmill or that had a single mill operating.

WOOD CHIP PRODUCTION ROSE BY 29 PERCENT TO RECORD HIGH

During 1977, the production of wood chips and sawdust from plant residues for use as pulpwood rose by 29 percent, from 1,733,100 to a record-high 2,291,200 cord equivalents. This increase resulted from the continuation of the upturn in primary wood manufacturing that began in late 1975, and from the increased demand for residues for pulp chips throughout the Northeast.

Chip production in 1977 constituted 30 percent of the total pulpwood production, up by 4 points from 1976. Hardwood chip production increased by 9 percent, but the 59-percent rise in chipped softwood residues was responsible for most of the increase in total chip production. The production of 1,103,100 cords of pulpwood chips from softwood residues was the largest ever recorded.

Since 1976, pulpwood chip production increased in 10 of the 14 northeastern states and decreased in 3:

	1976	*1977*	*Change*
	(thousand cord equivalents)		*(percent)*
Connecticut	2.4	3.5	+46
Delaware	12.6	13.2	+ 5
Kentucky	238.0	215.5	−10
Maine	484.1	900.0	+86
Maryland	108.3	106.1	− 2
Massachusetts	32.1	34.1	+ 6
New Hampshire	140.1	147.7	+ 5
New Jersey	7.5	5.4	−28
New York	156.5	158.9	+ 2
Ohio	112.7	175.6	+56
Pennsylvania	284.3	299.5	+ 5
Rhode Island	[a]	[a]	[b]
Vermont	44.6	73.6	+65
West Virginia	149.9	158.1	+ 5
Total	1,773.1	2,291.2	+29

[a]Less than 50 cord equivalents.
[b]Less than 0.5 percent change.

New records were set again in Maine where chip production of 900,000 cords represents an absolute volume gain of 415,900 cords and an 86 percent gain. The total chip production and the volume gain were all-time highs for both Maine and the region as well. All-time highs in production of chips were also recorded in Connecticut, Delaware, Massachusetts, New Hampshire, Ohio, and Vermont.

APPENDIX

Definition of terms

Commercial species. Tree species suitable for industrial wood products at present or in the future.

Diameter at breast height (dbh). The diameter outside bark of a standing tree measured at 4½ feet, or 1.3716 meters, above the ground.

Growing-stock trees. Live trees of commercial species classified as sawtimber, poletimber, saplings, and seedlings; that is, all live trees of commercial pecies except rough and rotten trees.

Growing-stock volume. The net volume in cubic feet of growing-stock trees 5.0 inches dbh or larger, from a 1-foot stump to a minimum 4.0-inch top diameter outside bark of the central stem, or to the point where the bole breaks into limbs. Net volume equals gross volume less deduction for cull.

Hardwoods. Dicotyledonous trees, usually broad-leaved and deciduous.

Harvest. The aggregate volume of timber produced for industrial or consumer uses.

Harvesting intensity. The growing-stock volume present in an area for each unit of timber production from the area, such as cubic feet of trees per cord of pulpwood.

Manufacturing plant residues. Wood materials, such as sawmill slabs and edgings, sawdust, veneer clippings and cores, post and pole trimming, and pulp screening generated from the manufacture of wood products.

Pulpwood. Roundwood converted into 4- or 5-foot lengths or chips and chipped plant residues that are used to make woodpulp.

Pulpwood receipts. Pulpwood received at woodpulp mills.

Pulpwood imports. Pulpwood receipts originating from outside the region.

Roundwood products. Logs, bolts, total-tree chips, and other round timber generated by harvesting trees for industrial or consumer use.

Softwoods. Coniferous trees, usually evergreen with needles or scalelike leaves.

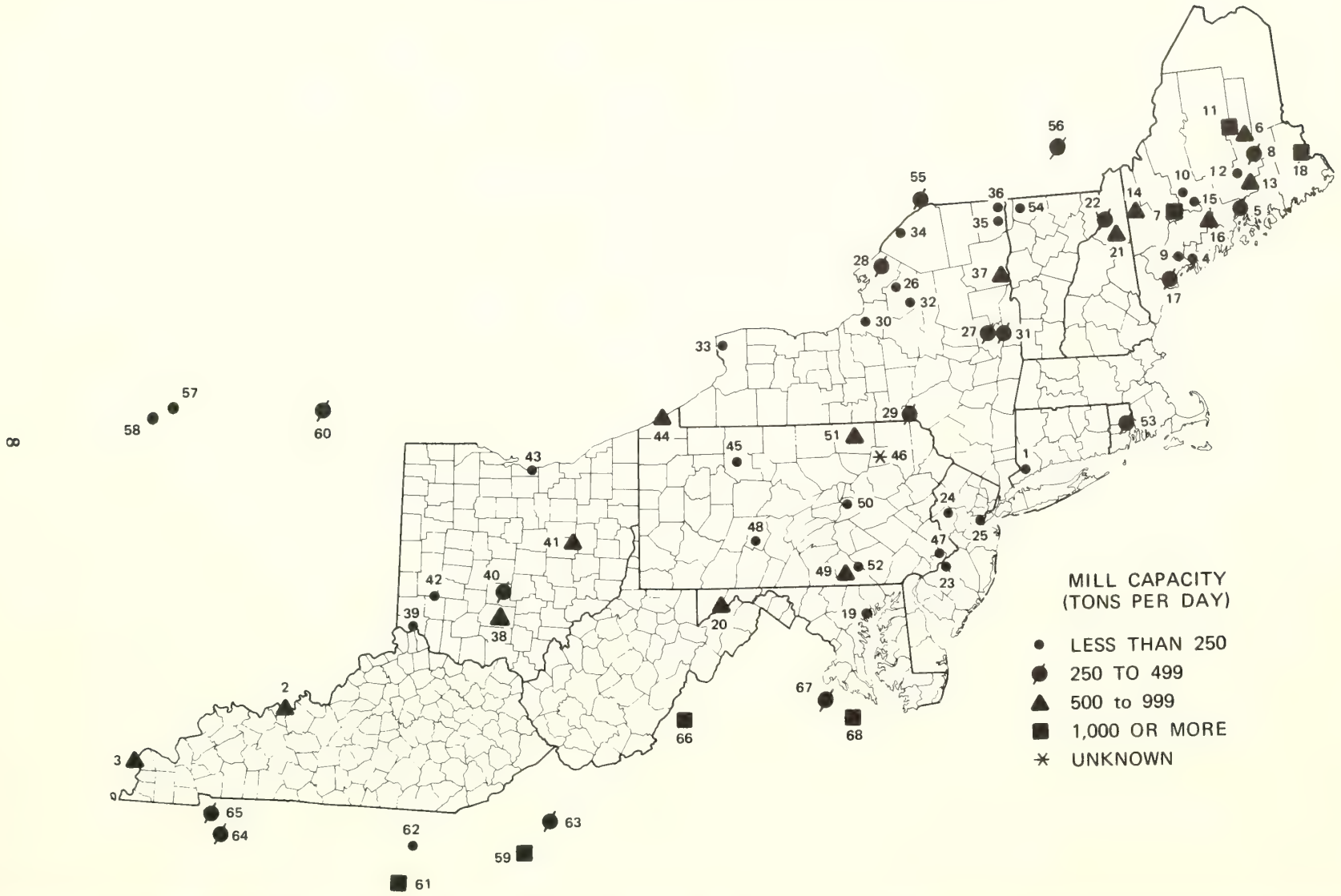
Standard cord. A unit of measure for stacked bolts of wood, encompassing 128 cubic feet of wood, bark, and air space. In the Northeast, the measure refers to a stack of wood containing 85 cubic feet, or 2.41 cubic meters, of solid wood.

Standard-cord equivalent. A unit of measure that is applied to forms of wood other than roundwood, such as chips, slabs, edgings, and other manufacturing residues and equal to 85 cubic feet of solid wood.

Timber products output. Production total from timber harvesting and plant byproduct recovery.

Total-tree chips. Unbarked wood chips generated from the aboveground portion of a tree, including bolewood, limbs, and leaves.

Figure 2.—Mills using northeastern pulpwood in 1977.



and oven-dry capacity in tons per 24 hours, 1977

Location	Company name	Type of pulp produced					
		Total	Sulfate	Ground-wood	Semi-chemical	Sulfite	Miscel-laneous[a]
WITHIN THE NORTHEAST							
Connecticut							
1. Stratford	Tilo Company, Inc.	35	—	—	—	—	35
Total (1 mill)		35	—	—	—	—	35
Kentucky							
2. Hawesville	Western Kraft Paper Group[b]	620	320	—	300	—	—
3. Wickliffe	Westvaco Corp.	600	600	—	—	—	—
Total (3 mills)		1,220	920	—	300	—	—
Maine							
4. Brunswick	Pejepscot Paper Co.	150	—	150	—	—	—
5. Bucksport	St. Regis Paper Co.[b]	500	—	350	—	—	150
6. East Millinocket	Great Northern Nekoosa Corp.	800	—	800	—	—	—
7. Jay	International Paper Co.[b]	1,350	1,200	150	—	—	—
8. Lincoln	Preco Corp.	360	360	—	—	—	—
9. Lisbon Falls	United States Gypsum Co.	100	—	100	—	—	—
10. Madison	Myllykoski O.P.	140	—	140	—	—	—
11. Millinocket	Great Northern Nekoosa Corp.[b]	1,500	—	900	—	600	—
12. Old Town	Lily Tulip Corp.	50	—	50	—	—	—
13. Old Town	Diamond International Corp.[b]	575	575	—	—	—	—
14. Rumford	Boise Cascade Corp.[b]	705	595	110	—	—	—
15. Shawmut	Keyes Fibre Co.	120	—	120	—	—	—
16. Skowhegan	Scott Paper Co.	750	750	—	—	—	—
17. Westbrook	Scott Paper Co.	300	300	—	—	—	—
18. Woodland	Georgia-Pacific Corp.[b]	1,040	800	240	—	—	—
Total (21 mills)		8,440	4,580	3,110	—	600	150
Maryland							
19. Finksburg	Congoleum Corp.	45	—	—	—	—	45
20. Luke	Westvaco Corp.	789	789	—	—	—	—
Total (2 mills)		834	789	—	—	—	45
New Hampshire							
21. Berlin	Brown Co.[b]	925	725	—	200	—	—
22. Groveton	Diamond International Corp.	250	—	—	250	—	—
Total (3 mills)		1,175	725	—	450	—	—
New Jersey							
23. Gloucester City	GAF Corp.	192	—	—	—	—	192
24. Manville	Johns-Manville Products Corp.	81	—	—	—	—	81
25. Perth Amboy	Jim Walter Corp.	100	—	—	—	—	100
Total (3 mills)		373	—	—	—	—	373

CONTINUED

Woodpulp Mills—Continued

Location	Company name	Type of pulp produced					
		Total	Sulfate	Ground-wood	Semi-chemical	Sulfite	Miscel-laneous[a]
New York							
26. Beaver Falls	Boise Cascade Corp.	70	—	70	—	—	—
27. Corinth	International Paper Co.	255	—	255	—	—	—
28. Deferiet	St. Regis Paper Co.	285	—	285	—	—	—
29. Deposit	Jim Walter Corp.	300	—	—	—	—	300
30. Fulton	Armstrong Cork Co.	130	—	—	—	—	130
31. Glens Falls	Finch, Pruyn & Co., Inc.	220	—	—	—	220	—
32. Lyons Falls	Georgia-Pacific Corp.	120	—	—	120	—	—
33. Niagara Falls	Nitec Paper Corp.	100	—	100	—	—	—
34. Ogdensburg	Diamond International Corp.	110	—	110	—	—	—
35. Plattsburgh	Diamond International Corp.	50	—	50	—	—	—
36. Plattsburgh	Georgia-Pacific Corp.	100	—	—	100	—	—
37. Ticonderoga	International Paper Co.	500	500	—	—	—	—
Total (12 mills)		2,240	500	870	220	220	430
Ohio							
38. Chillicothe	The Mead Corp.	600	600	—	—	—	—
39. Cincinnati	Jim Walter Corp.	100	—	—	—	—	100
40. Circleville	Container Corp. of America	300	—	—	300	—	—
41. Coshocton	Stone Container Corp.	650	—	—	650	—	—
42. Franklin	Bird & Son, Inc.	80	—	—	—	—	80
43. Milan	Certain-Teed Corp.	90	—	—	—	—	90
Total (6 mills)		1,820	600	—	950	—	270
Pennsylvania							
44. Erie	Hammermill Paper Co.	700	—	—	700	—	—
45. Johnsonburg	Penntech Papers, Inc.	190	190	—	—	—	—
46. Mehoopany	Proctor & Gamble Co.	c	—	—	—	c	—
47. Philadelphia	Jim Walter Corp.	160	—	—	—	—	160
48. Roaring Spring	Appleton Papers, Inc.	180	180	—	—	—	—
49. Spring Grove	The P. H. Glatfelter Co.	525	525	—	—	—	—
50. Sunbury	Jim Walter Corp.	240	—	—	240	—	—
51. Towanda	Masonite Corp.	500	—	—	—	—	500
52. York	Certain-Teed Products Corp.	50	—	—	—	—	50
Total (9 mills)		2,545	895	—	940	c	710
Rhode Island							
53. Phillipsdale	Bird and Son, Inc.	275	—	—	—	—	275
Total (1 mill)		275	—	—	—	—	275

Vermont							
54. Sheldon Springs	Saxon Industries	50	—	50	—	—	—
Total (1 mill)		50	—	50	—	—	—
All northeast states (62 mills)		19,007	9,009	4,030	2,860	820	2,288
	OUTSIDE THE NORTHEAST						
Canada							
55. Cornwall	Domtar Woodlands, Ltd.	400	400	—	—	—	—
56. Windsor	Domtar Woodlands, Ltd.	480	480	—	—	—	—
Total (2 mills)		880	880	—	—	—	—
Illinois							
57. Chicago	Bird and Son, Inc.	40	—	40	—	—	—
58. Joliet	GAF Corp.	100	—	100	—	—	—
Total (2 mills)		140	—	140	—	—	—
North Carolina							
59. Canton	Champion International Corp.	1,385	1,385	—	—	—	—
Total (1 mill)		1,385	1,385	—	—	—	—
Michigan							
60. Otsego	The Menasha Corp.	250	—	—	250	—	—
Total (1 mill)		250	—	—	250	—	—
Tennessee							
61. Calhoun	Bowater Southern Paper Corp.[b]	1,700	550	925	—	—	225
62. Harriman	Harriman Paperboard Corp.	190	—	—	190	—	—
63. Kingsport	The Mead Corp.	270	—	—	—	270	—
64. New Johnsonville	Inland Container Corp.	450	—	—	450	—	—
65. Paris	Jim Walter Corp.	300	—	—	—	—	300
Total (7 mills)		2,910	550	925	640	270	525
Virginia							
66. Covington	Westvaco Corp.[b]	1,260	1,100	—	160	—	—
67. Doswell	Weyerhauser Corp.	300	—	300	—	—	—
68. West Point	Chesapeake Corp. of Va.	1,150	1,150	—	—	—	—
Total (4 mills)		2,710	2,250	300	160	—	—
Total all other states		8,275	5,065	1,365	1,050	270	525
Total all states		27,282	14,074	5,395	3,910	1,090	2,813

[a]Roofing, insulation board, and hardboard plants.
[b]More than one pulpmill operating.
[c]Capacity unknown.

INDEX TO TABLES

1. Total production of pulpwood in the Northeast, by state and source, 1977
2. Total production and receipts of pulpwood in the Northeast, by state and softwood and hardwood, 1977
3. Pulpwood production from roundwood in the Northeast, by state, softwood and hardwood, and destination of shipments, 1977
4. Pulpwood chip production from manufacturing residues in the Northeast, by state, softwood and hardwood, and destination of shipments, 1977
5. Pulpwood receipts from roundwood in the Northeast, by state and softwood and hardwood, 1977
6. Pulpwood chip receipts from plant residues in the Northeast, by state and softwood and hardwood, 1977
7. Pulpwood from roundwood received from states outside the Northeast, by state (or province) of origin and softwood and hardwood, 1977
8. Pulpwood chip receipts from wood-using plants outside the Northeast, by state (or province) of origin and softwood and hardwood, 1977
9. Pulpwood production from roundwood in the Northeast, by state and selected species, 1977
10. Pulpwood production from roundwood in Kentucky and Ohio, by state, county, and selected species, 1977
11. Pulpwood production from roundwood in southern New England, by state, county, and selected species, 1977
12. Pulpwood production from roundwood in northern New England, by state, county, and selected species, 1977
13. Pulpwood production from roundwood in New York, by county and selected species, 1977
14. Pulpwood production from roundwood in Pennsylvania, by county and selected species, 1977
15. Pulpwood production from roundwood in Delaware, Maryland, and New Jersey, by state, county, and selected species, 1977
16. Pulpwood production from roundwood in West Virginia, by county and selected species, 1977

Metric Equivalents

One standard cord = 85 cubic feet (ft^3) = 2.41 cubic meters (m^3)
One cubic foot (ft^3) = 28,317 cubic centimeters (cm^3) = 0.028 cubic meters (m^3)
One inch = 2.540 centimeters (cm)

Nevel, Robert L., Jr., and David R. Dickson.
1979. **Northeastern pulpwood 1977—An annual assessment of regional timber output.** Northeast. For. Exp. Stn., Broomall, Pa.
27 p., illus. (USDA For. Serv. Resour. Bull. NE-60)

This annual assessment of regional timber output is based on a canvass of the pulpmills in the Northeast. The report contains a discussion and tabular data on roundwood and chips from plant residues produced in and received by 14 northeastern states in 1977: pulpwood production by state, county, and species group; pulpwood receipts from roundwood by state and species group; pulpwood chip receipts by state and species group; and production of total-tree chips. From 1976 to 1977, pulpwood production increased by 10 percent; roundwood production rose 4 percent; and chipped residue production jumped by 29 percent. Current record levels are discussed and trends in pulpwood production for the past 15 years are illustrated. A list of the woodpulp mills that received northeastern pulpwood during 1977 is included.

861.0(74):721:792

Keywords: Pulpwood, Northeast, timber output

Nevel, Robert L., Jr., and David R. Dickson.
1979. **Northeastern pulpwood 1977—An annual assessment of regional timber output.** Northeast. For. Exp. Stn., Broomall, Pa.
27 p., illus. (USDA For. Serv. Resour. Bull. NE-60)

This annual assessment of regional timber output is based on a canvass of the pulpmills in the Northeast. The report contains a discussion and tabular data on roundwood and chips from plant residues produced in and received by 14 northeastern states in 1977: pulpwood production by state, county, and species group; pulpwood receipts from roundwood by state and species group; pulpwood chip receipts by state and species group; and production of total-tree chips. From 1976 to 1977, pulpwood production increased by 10 percent; roundwood production rose by 4 percent; and chipped residue production jumped by 29 percent. Current record levels are discussed and trends in pulpwood production for the past 15 years are illustrated. A list of the woodpulp mills that received northeastern pulpwood during 1977 is included.

81.0(74):721:792

Keywords: Pulpwood, Northeast, timber output

Table 1.—Total production of pulpwood in the Northeast, by state and source, 1977

(In thousands of standard cords)[a]

State	Source		
	Round-wood	Plant residues	All sources
Connecticut	6.3	3.5	9.8
Delaware	35.2	13.2	48.4
Kentucky	62.8	215.5	278.3
Maine	2,810.2	900.0	3,710.2
Maryland	179.2	106.1	285.3
Massachusetts	10.5	34.1	44.6
New Hampshire	350.4	147.7	498.1
New Jersey	26.2	5.4	31.6
New York	634.2	158.9	793.1
Ohio	286.7	175.6	462.3
Pennsylvania	567.3	299.5	866.8
Rhode Island	2.7	b	2.7
Vermont	219.4	73.6	283.0
West Virginia	185.9	158.1	344.0
All states	5,377.0	2,291.2	7,668.2

[a]Rough wood basis, equivalent to 85 ft^3 solid wood.

[b]Less than 50 cord equivalents.

Table 2.—Total production and receipts of pulpwood in the Northeast, by state and softwood and hardwood, 1977

(In thousands of standard cords)

State	Production		Receipts		Production surplus (+) or deficit (−)
	Softwood	Hardwood	Softwood	Hardwood	
Connecticut	6.7	3.1	(D)	(D)	+(D)
Delaware	38.0	10.4	—	—	+48.4
Kentucky	15.5	262.8	220.5	461.3	−403.5
Maine	2,753.6	956.6	3,073.4	997.1	−360.3
Maryland	180.9	104.4	154.9	284.9	−154.5
Massachusetts	28.5	16.1	—	—	+44.6
New Hampshire	219.3	278.8	155.3	402.8	−60.0
New Jersey	28.9	2.7	39.8	10.4	−18.6
New York	253.6	539.5	329.7	459.6	+3.8
Ohio	7.1	455.2	29.3	568.3	−135.3
Pennsylvania	43.1	823.7	234.1	959.2	−326.5
Rhode Island	.8	1.9	(D)	(D)	−(D)
Vermont	124.8	168.2	(D)	(D)	+(D)
West Virginia	44.2	299.8	—	—	+344.0
All states	3,745.0	3,923.2	4,268.4	4,149.4	−749.6

(D) Withheld to avoid disclosure of data from individual mills.

Table 3.—Pulpwood production from roundwood in the Northeast, by state, softwood and hardwood, and destination of shipments, 1977

(In thousands of standard cords)

State	Softwood				Hardwood				Total production
	Cut and retained in state	Shipped to other states		Total Softwood	Cut and retained in state	Shipped to other states		Total hardwood	
		In Northeast	Outside Northeast			In Northeast	Outside Northeast		
Connecticut	3.5	1.1	—	4.6	—	1.7	—	1.7	6.3
Delaware	—	12.8	18.6	31.4	—	3.8	—	3.8	35.2
Kentucky	—	—	7.9	7.9	25.0	21.1	8.8	54.9	62.8
Maine	1,945.1	27.7	—	1,972.8	766.8	70.6	—	837.4	2,810.2
Maryland	25.6	40.2	55.1	120.9	50.6	7.7	—	58.3	179.2
Massachusetts	—	9.0	—	9.0	—	1.5	—	1.5	10.5
New Hampshire	36.8	64.8	—	101.6	196.5	52.3	—	248.8	350.4
New Jersey	25.2	—	—	25.2	1.0	—	—	1.0	26.2
New York	194.6	7.2	—	201.8	319.3	20.3	92.8	432.4	634.2
Ohio	—	5.0	—	5.0	281.7	—	—	281.7	286.7
Pennsylvania	18.2	10.7	—	28.9	495.5	42.9	—	538.4	567.3
Rhode Island	.8	—	—	.8	1.9	—	—	1.9	2.7
Vermont	18.1	75.6	—	93.7	—	125.7	—	125.7	219.4
West Virginia	—	35.8	2.5	38.3	—	99.7	47.9	147.6	185.9
Total	2,267.9	289.9	84.1	2,641.9	2,138.3	447.3	149.5	2,735.1	5,377.0

Table 4.—Pulpwood chip production from manufacturing residues in the Northeast, by state, softwood and hardwood, and destination of shipments, 1977[a]

(In thousands of standard-cord equivalents)

State	Softwood				Hardwood				Total production
	Cut and retained in state	Shipped to other states		Total Softwood	Cut and retained in state	Shipped to other states		Total hardwood	
		In Northeast	Outside Northeast			In Northeast	Outside Northeast		
Connecticut	—	2.1	—	2.1	—	1.4	—	1.4	3.5
Delaware	—	6.6	—	6.6	—	6.6	—	6.6	13.2
Kentucky	—	6.2	1.4	7.6	145.5	32.9	29.5	207.9	215.5
Maine	779.9	.9	—	780.8	112.0	7.2	—	119.2	900.0
Maryland	6.9	53.1	—	60.0	12.8	33.3	—	46.1	106.1
Massachusetts	—	19.5	—	19.5	—	14.6	—	14.6	34.1
New Hampshire	59.6	58.1	—	117.7	19.3	10.7	—	30.0	147.7
New Jersey	—	3.7	—	3.7	—	1.7	—	1.7	5.4
New York	28.2	23.6	—	51.8	48.0	59.0	.1	107.1	158.9
Ohio	1.0	.4	.7	2.1	173.2	.3	—	173.5	175.6
Pennsylvania	12.3	1.9	—	14.2	238.4	46.9	—	285.3	299.5
Rhode Island	—	—	—	—	—	b	—	b	b
Vermont	—	31.1	b	31.1	—	42.5	—	42.5	73.6
West Virginia	—	5.9	—	5.9	—	152.2	—	152.2	158.1
All states	887.9	213.1	2.1	1,103.1	749.2		29.6	1,188.1	2,291.2

[a]Includes sawmill slabs and edgings, sawdust, veneer cords, and post and pole trimmings.

[b]Less than 50 cords.

Table 5.—Pulpwood receipts from roundwood in the Northeast, by state and softwood and hardwood, 1977
(In thousands of standard cords)

State[a]	Softwood				Hardwood				Total receipts
	Cut and retained in state	Receipts from other states		Total Softwood	Cut and retained in state	Receipts from other states		Total hardwood	
		In Northeast	Outside Northeast			In Northeast	Outside Northeast		
Connecticut	3.5	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Kentucky	—	—	168.2	168.2	25.0	—	60.1	85.1	253.3
Maine	1,945.1	45.0	144.4	2,134.5	766.8	52.8	49.9	869.5	3,004.0
Maryland	25.6	45.7	47.9	119.2	50.6	126.3	5.4	182.3	301.5
New Hampshire	36.8	46.2	b	83.0	196.5	166.6	2.5	365.6	448.6
New Jersey	25.2	3.0	—	28.2	1.0	.5	—	1.5	29.7
New York	194.6	77.8	.3	272.7	319.3	30.8	—	350.1	622.8
Ohio	—	—	—	—	281.7	32.4	4.0	318.1	318.1
Pennsylvania	18.2	63.2	60.9	142.3	495.5	34.0	1.8	531.3	673.6
Rhode Island	.8	(D)	(D)	(D)	1.9	(D)	(D)	(D)	(D)
Vermont	18.1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
All states	2,267.9	289.9	421.7	2,979.5	2,138.3	447.3	123.7	2,709.3	5,688.8

[a]States with no pulpmills are omitted.
[b]Less than 50 cord equivalents.
(D) Withheld to avoid disclosure of data from individual mills.

Table 6.—Pulpwood chip receipts from plant residues in the Northeast, by state and softwood and hardwood, 1977[a]
(In thousands of standard-cord equivalents)

State[b]	Softwood				Hardwood				Total receipts
	Cut and retained in state	Receipts from other states		Total Softwood	Cut and retained in state	Receipts from other states		Total hardwood	
		In Northeast	Outside Northeast			In Northeast	Outside Northeast		
Connecticut	—	(D)	(D)	(D)	—	(D)	(D)	(D)	(D)
Kentucky	—	—	52.3	52.3	145.5	—	230.7	376.2	428.5
Maine	779.9	64.9	94.1	938.9	112.0	10.6	5.0	127.6	1,066.5
Maryland	6.9	3.4	25.4	35.7	12.8	82.1	7.7	102.6	138.3
New Hampshire	59.6	9.0	3.7	72.3	19.3	16.1	1.8	37.2	109.5
New Jersey	—	11.6	—	11.6	—	8.9	—	8.9	20.5
New York	28.2	28.8	—	57.0	48.0	45.9	15.6	109.5	166.5
Ohio	1.0	21.7	6.6	29.3	173.2	73.4	3.6	250.2	279.5
Pennsylvania	12.3	73.7	5.8	91.8	238.4	172.3	17.2	427.9	519.7
Rhode Island	—	(D)	(D)	(D)	—	(D)	(D)	(D)	(D)
Vermont	—	(D)	(D)	(D)	—	(D)	(D)	(D)	(D)
All states	887.9	213.1	187.9	1,288.9	749.2	409.3	281.6	1,440.1	2,729.0

[a]Includes sawmill slabs and edgings, sawdust, veneer cords, and post and pole trimmings.
[b]States with no pulpmills are omitted.

Table 7.—Pulpwood from roundwood received from states outside the Northeast, by state (or province) of origin and softwood and hardwood, 1977

(In thousands of standard cords)

Receiving state[a]	State or province of origin	Total softwood	Total hardwood	All species
Kentucky	Illinois	6.1	11.4	17.5
	Indiana	—	18.4	18.4
	Mississippi	149.5	10.1	159.6
	Missouri	—	7.6	7.6
	Tennessee	12.6	12.6	25.2
Maine	New Brunswick	144.4	49.9	194.3
Maryland	Virginia	47.9	5.4	53.3
New Hampshire	Quebec	b	2.5	2.5
New York	Ontario	.3	—	.3
Ohio	Indiana	—	4.0	4.0
Pennsylvania	Virginia	60.9	1.8	62.7
All states		421.7	123.7	545.4

[a]States with no extraregional receipts are omitted.
[b]Less than 50 cord equivalents.

Table 8.—Pulpwood chip receipts from wood-using plants outside the Northeast, by state (or province) of origin and softwood and hardwood, 1977[a]

(In thousands of standard-cord equivalents)

Receiving state[b]	State or province of origin	Total softwood	Total hardwood	All species
Kentucky	Alabama	—	5.8	5.8
	Arkansas	—	5.7	5.7
	Illinois	1.9	32.6	34.5
	Indiana	—	55.6	55.6
	Mississippi	47.2	18.1	65.3
	Missouri	3.2	56.0	59.2
	Tennessee	—	56.9	56.9
Maine	New Brunswick	29.6	4.7	34.3
	Quebec	64.5	.3	64.8
Maryland	Virginia	25.4	7.7	33.1
New Hampshire	Quebec	3.7	1.8	5.5
New York	Ontario	—	13.8	13.8
	Quebec	—	1.8	1.8
Ohio	Indiana	—	2.9	2.9
	South Carolina	.3	—	.3
	Texas	.2	—	.2
	Virginia	6.1	.7	6.8
Pennsylvania	Virginia	5.8	17.2	23.0
All states		187.9	281.6	469.5

[a]Includes sawmill slabs and edgings, sawdust, veneer cores, and post and pole trimmings.
[b]States with no extraregional receipts are omitted.

Table 9.—Pulpwood production from roundwood in the Northeast, by state and selected species, 1977
(In thousands of standard cords)

State	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Connecticut	—	—	4.6	4.6	—	0.8	0.9	1.7	6.3
Delaware	—	—	31.4	31.4	—	1.9	1.9	3.8	35.2
Kentucky	—	—	7.9	7.9	2.8	44.9	7.2	54.9	62.8
Maine	1,588.3	204.0	180.5	1,972.8	92.2	16.2	729.0	837.4	2,810.2
Maryland	—	.8	120.1	120.9	—	34.4	23.9	58.3	179.2
Massachusetts	1.2	—	7.8	9.0	—	.7	.8	1.5	10.5
New Hampshire	54.6	11.0	36.0	101.6	17.4	15.5	215.9	248.8	350.4
New Jersey	—	—	25.2	25.2	—	a	1.0	1.0	26.2
New York	68.3	57.8	75.7	201.8	62.9	67.0	302.5	432.4	634.2
Ohio	—	—	5.0	5.0	—	206.9	74.8	281.7	286.7
Pennsylvania	—	5.2	23.7	28.9	41.4	209.1	287.9	538.4	567.3
Rhode Island	—	—	.8	.8	—	.9	1.0	1.9	2.7
Vermont	76.4	8.2	9.1	93.7	9.2	2.8	113.7	125.7	219.4
West Virginia	.2	1.7	36.4	38.3	—	58.2	89.4	147.6	185.9
All states	1,789.0	288.7	564.2	2,641.9	225.9	659.3	1,849.9	2,735.1	5,377.0

[a]Less than 50 cords.

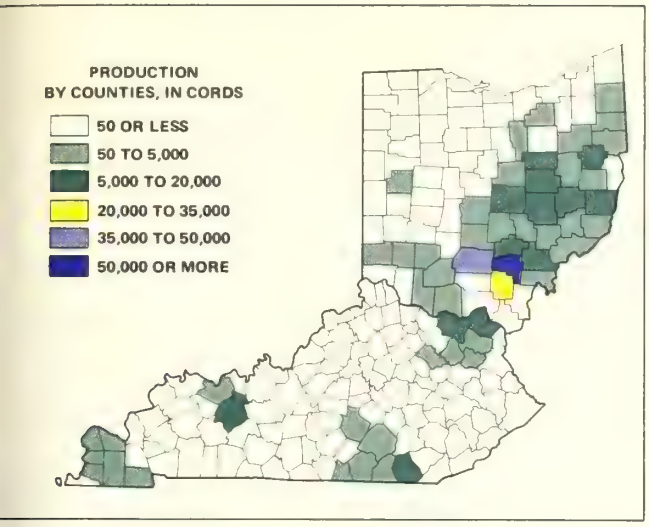


Figure 3.—Geographical pattern of pulpwood production from roundwood in Kentucky and Ohio, by county, 1977.

Table 10.—Pulpwood production from roundwood in Kentucky and Ohio, by state, county, and selected species, 1977

(In thousands of standard cords)

County[a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
				KENTUCKY					
Ballard	—	—	—	—	0.9	1.9	1.4	4.2	4.2
Bath	—	—	—	—	—	.4	—	.4	.4
Calloway	—	—	—	—	.1	.3	.3	.7	.7
Carlisle	—	—	—	—	.6	1.4	1.1	3.1	3.1
Carter	—	—	—	—	—	1.6	—	1.6	1.6
Casey	—	—	—	—	—	2.3	b	2.3	2.3
Clinton	—	—	—	—	—	1.5	.4	1.9	1.9
Daviess	—	—	—	—	—	.5	—	.5	.5
Elliott	—	—	—	—	—	.4	—	.4	.4
Graves	—	—	—	—	.6	1.7	1.4	3.7	3.7
Greenup	—	—	—	—	—	12.7	—	12.7	12.7
Harlan	—	—	—	—	—	—	b	b	b
Hickman	—	—	—	—	.2	.5	.4	1.1	1.1
Lewis	—	—	—	—	—	5.0	—	5.0	5.0
McCracken	—	—	—	—	.4	.9	.7	2.0	2.0
McCreary	—	—	2.8	2.8	—	.8	.5	1.3	4.1
Ohio	—	—	—	—	—	8.5	—	8.5	8.5
Pulaski	—	—	—	—	—	.1	b	.1	.1
Rowan	—	—	—	—	—	1.1	—	1.1	1.1
Wayne	—	—	.2	.2	—	.8	.2	1.0	1.2
Whitley	—	—	4.9	4.9	—	2.5	.8	3.3	8.2
Total	—	—	7.9	7.9	2.8	44.9	7.2	54.9	62.8

CONTINUED

Table 10—Continued

County[a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
					OHIO				
Adams	—	—	—	—	—	1.1	—	1.1	1.1
Ashland	—	—	—	—	—	—	0.2	.2	.2
Athens	—	—	0.3	0.3	—	3.6	3.0	6.6	6.9
Belmont	—	—	b	b	—	—	5.4	5.4	5.4
Brown	—	—	—	—	—	2.3	—	2.3	2.3
Butler	—	—	—	—	—	.1	—	.1	.1
Carroll	—	—	—	—	—	—	5.8	5.8	5.8
Clinton	—	—	—	—	—	.1	—	.1	.1
Columbiana	—	—	—	—	—	—	.4	.4	.4
Coshocton	—	—	—	—	—	—	11.5	11.5	11.5
Fairfield	—	—	b	b	—	3.3	1.1	4.4	4.4
Franklin	—	—	—	—	—	.3	—	.3	.3
Gallia	—	—	.6	.6	—	13.1	—	13.1	13.7
Guernsey	—	—	—	—	—	—	6.1	6.1	6.1
Harrison	—	—	—	—	—	—	3.8	3.8	3.8
Highland	—	—	—	—	—	3.6	—	3.6	3.6
Hocking	—	—	—	—	—	10.8	2.9	13.7	13.7
Holmes	—	—	—	—	—	—	7.3	7.3	7.3
Jackson	—	—	.1	.1	—	23.1	—	23.1	23.2
Jefferson	—	—	b	b	—	—	—	—	b
Knox	—	—	—	—	—	—	.4	.4	.4
Lawrence	—	—	.5	.5	—	7.5	.7	8.2	8.7
Licking	—	—	—	—	—	6.6	3.6	10.2	10.2
Mahoning	—	—	1.8	1.8	—	—	.8	.8	2.6
Medina	—	—	—	—	—	—	.1	.1	.1
Meigs	—	—	.5	.5	—	2.6	—	2.6	3.1
Monroe	—	—	—	—	—	—	.4	.4	.4
Morgan	—	—	—	—	—	—	.8	.8	.8
Muskingum	—	—	—	—	—	—	11.1	11.1	11.1
Noble	—	—	—	—	—	—	2.7	2.7	2.7
Perry	—	—	—	—	—	1.4	1.3	2.7	2.7
Pickaway	—	—	—	—	—	2.9	1.0	3.9	3.9
Pike	—	—	—	—	—	17.9	—	17.9	17.9
Ross	—	—	—	—	—	35.2	—	35.2	35.2
Scioto	—	—	b	b	—	15.0	—	15.0	15.0
Shelby	—	—	—	—	—	.7	.2	.9	.9
Stark	—	—	—	—	—	—	1.1	1.1	1.1
Trumbull	—	—	.6	.6	—	—	—	—	.6
Tuscarawas	—	—	—	—	—	—	2.3	2.3	2.3
Vinton	—	—	.6	.6	—	55.5	.4	55.9	56.5
Warren	—	—	—	—	—	.2	—	.2	.2
Washington	—	—	—	—	—	—	.4	.4	.4
Total	—	—	5.0	5.0	—	206.9	74.8	281.7	286.7

[a] Counties with no production are omitted.
[b] Less than 50 cords.

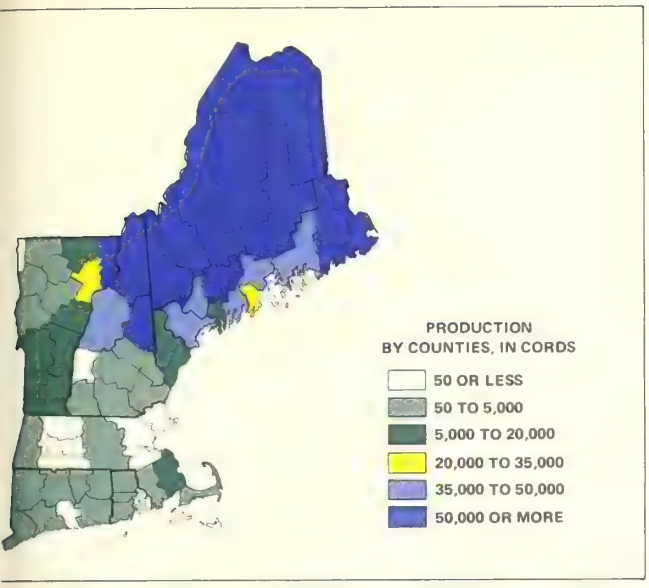


Figure 4.—Geographical pattern of pulpwood production from roundwood in the New England States, 1977.

Table 11.—Pulpwood production from roundwood in southern New England, by state, county, and selected species, 1977
(In thousands of standard cords)

County[a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
CONNECTICUT									
Fairfield	—	—	0.8	0.8	—	—	—	—	0.8
Hartford	—	—	.6	.6	—	—	—	—	.6
Litchfield	—	—	.4	.4	—	—	—	—	.4
Middlesex	—	—	b	b	—	—	—	—	b
New Haven	—	—	1.7	1.7	—	—	—	—	1.7
New London	—	—	.2	.2	—	0.1	0.1	0.2	.4
Tolland	—	—	.1	.1	—	.1	.1	.2	.3
Windham	—	—	.8	.8	—	.6	.7	1.3	2.1
Total	—	—	4.6	4.6	—	0.8	0.9	1.7	6.3
MASSACHUSETTS									
Barnstable	—	—	0.6	0.6	—	—	—	—	0.6
Berkshire	1.2	—	.1	1.3	—	—	—	—	1.3
Bristol	—	—	1.3	1.3	—	0.3	0.4	0.7	2.0
Plymouth	—	—	5.3	5.3	—	.4	.4	.8	6.1
Worcester	—	—	.5	.5	—	—	—	—	.5
Total	1.2	—	7.8	9.0	—	0.7	0.8	1.5	10.5
RHODE ISLAND									
Kent	—	—	0.2	0.2	—	0.5	0.5	1.0	1.2
Providence	—	—	.4	.4	—	.2	.3	.5	.9
Washington	—	—	.2	.2	—	.2	.2	.4	.6
Total	—	—	0.8	0.8	—	0.9	1.0	1.9	2.7

[a] Counties with no production are omitted.
[b] Less than 50 cords.

Table 12.—Pulpwood production from roundwood in northern New England, by state, county, and selected species, 1977

(In thousands of standard cords)

County[a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
MAINE									
Androscoggin	2.3	4.2	15.7	22.2	2.8	1.6	10.1	14.5	36.7
Aroostook	503.2	12.3	5.1	520.6	29.0	—	76.5	105.5	626.1
Cumberland	3.4	3.9	17.7	25.0	1.8	1.6	12.1	15.5	40.5
Franklin	34.6	8.5	5.4	48.5	10.8	1.8	81.2	93.8	142.3
Hancock	23.5	5.2	3.3	32.0	—	.4	16.3	16.7	48.7
Kennebec	7.7	9.1	18.4	35.2	3.1	1.1	24.1	28.3	63.5
Knox	5.3	3.6	7.6	16.5	1.4	.9	5.3	7.6	24.1
Lincoln	5.0	5.5	18.2	28.7	.6	.5	11.4	12.5	41.2
Oxford	53.2	20.8	21.9	95.9	6.3	5.3	148.0	159.6	255.5
Penobscot	109.4	44.9	6.1	160.4	12.8	.3	57.5	70.6	231.0
Piscataquis	346.6	19.1	8.0	373.7	3.6	b	116.3	119.9	493.6
Sagadahoc	1.9	1.7	8.2	11.8	—	.6	4.2	4.8	16.6
Somerset	346.4	24.0	18.2	388.6	4.4	.4	46.5	51.3	439.9
Waldo	17.4	5.6	8.2	31.2	.6	.6	12.5	13.7	44.9
Washington	128.8	33.0	9.2	170.4	14.7	.1	102.4	117.2	287.6
York	.2	2.6	9.3	12.1	.3	1.0	4.6	5.9	18.0
Total	1,588.3	204.0	180.5	1,972.8	92.2	16.2	729.0	837.4	2,810.2
NEW HAMPSHIRE									
Belknap	b	b	b	b	b	b	0.1	0.1	0.1
Carroll	2.3	6.6	26.5	35.4	2.7	9.4	36.9	49.0	84.4
Cheshire	.1	—	—	.1	—	—	—	—	.1
Coos	49.0	3.4	4.6	56.9	9.9	.7	149.6	160.2	217.1
Grafton	3.2	.8	3.7	7.7	4.6	4.2	26.9	35.7	43.4
Hillsborough	b	b	b	b	—	.1	.1	.2	.2
Merrimack	b	b	.1	.1	.2	1.0	2.0	3.2	3.3
Rockingham	b	b	.5	.5	—	b	b	b	.5
Strafford	b	.2	.7	.9	b	.1	.3	.4	1.3
Total	54.6	11.0	36.0	101.6	17.4	15.5	215.9	248.8	350.4
VERMONT									
Addison	b	b	b	b	—	0.1	1.3	1.4	1.4
Bennington	.2	.5	.2	.9	0.2	0.4	4.7	5.3	6.2
Caledonia	15.4	1.4	2.2	19.0	1.3	.6	12.2	14.1	33.1
Chittenden	.5	.1	.1	.7	b	b	.7	.7	1.4
Essex	37.4	1.4	2.2	41.0	4.5	.3	70.0	74.8	115.8
Franklin	.7	—	.1	.8	—	—	—	—	.8
Lamoille	2.0	b	.1	2.1	—	—	b	b	2.1
Orange	5.5	1.2	.8	7.5	1.2	.6	8.5	10.3	17.8
Orleans	7.7	1.6	.3	9.6	.2	b	7.1	7.3	16.9
Rutland	1.4	.5	2.2	4.1	1.2	.3	3.6	5.1	9.2
Washington	.2	.1	—	.3	b	—	.1	.1	.4
Windham	2.7	.8	.1	3.6	.4	.3	2.7	3.4	7.0
Windsor	2.7	.6	.8	4.1	.2	.2	2.8	3.2	7.3
Total	76.4	8.2	9.1	93.7	9.2	2.8	113.7	125.7	219.4

[a] Counties with no production are omitted.

[b] Less than 50 cords.

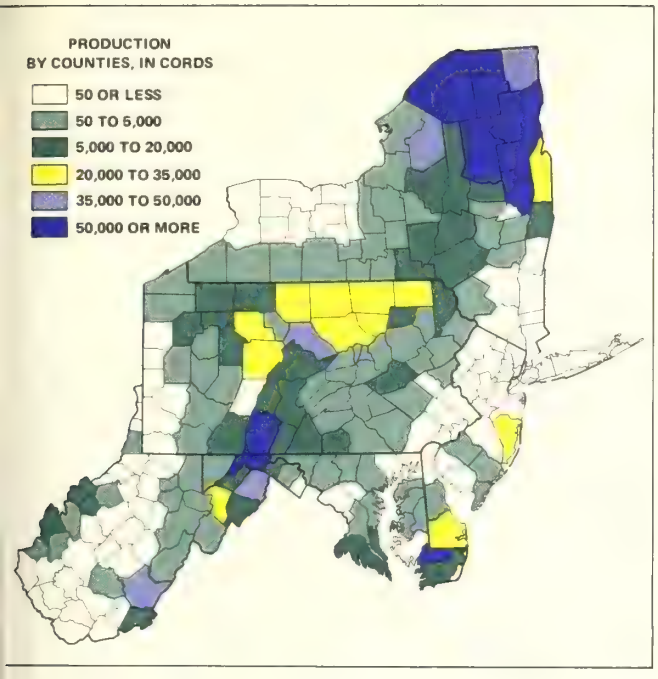


Figure 5.—Geographical pattern of pulpwood production from roundwood in the Middle Atlantic States, 1977.

Table 13.—Pulpwood production from roundwood in New York, by county and selected species, 1977

(In thousands of standard cords)

County[a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Albany	1.1	—	2.6	3.7	b	—	—	b	3.7
Allegany	—	—	—	—	—	—	0.2	0.2	0.2
Broome	b	—	b	b	0.5	2.4	4.5	7.4	7.4
Cattaraugus	—	—	2.0	2.0	—	1.5	—	1.5	3.5
Cayuga	.6	—	—	.6	.1	—	—	.1	.7
Chautauqua	—	—	—	—	—	—	1.6	1.6	1.6
Chemung	—	—	—	—	.4	.4	1.5	2.3	2.3
Chenango	7.6	—	b	7.6	.4	.6	2.9	3.9	11.5
Clinton	4.2	1.0	4.8	10.0	9.4	10.5	12.1	32.0	42.0
Cortland	.6	—	—	.6	.1	—	—	.1	.7
Delaware	3.2	—	1.2	4.4	.2	2.5	2.4	5.1	9.5
Essex	1.7	12.1	11.2	25.0	6.2	19.0	43.3	68.5	93.5
Franklin	12.7	1.0	4.3	18.0	12.1	10.8	30.7	53.6	71.6
Fulton	—	2.4	1.7	4.1	.7	—	7.0	7.7	11.8
Green	—	b	—	b	—	—	.2	.2	.2
Hamilton	5.4	9.5	1.1	16.0	2.7	2.1	45.3	50.1	66.1
Herkimer	3.8	.7	.7	5.2	.2	.5	9.1	9.8	15.0
Jefferson	1.3	—	1.0	2.3	1.4	—	b	1.4	3.7
Lewis	8.2	—	3.1	11.3	2.8	.1	25.0	27.9	39.2
Madison	.8	—	.3	1.1	b	—	—	b	1.1
Montgomery	—	—	.3	.3	b	b	.3	.3	.6
Oneida	1.7	.5	0.3	5.2	.2	.2	3.8	4.2	9.4
Onondaga	—	—	—	—	.1	—	.1	.2	.2
Oswego	.6	—	.8	1.4	.1	—	.4	.5	1.9
Otsego	1.3	—	4.7	6.0	.2	.1	.4	.7	6.7
Rensselaer	.4	2.4	4.0	6.8	.3	.1	8.5	8.9	15.7

CONTINUED

Table 13—Continued

County[a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
St. Lawrence	10.5	.1	2.8	13.4	15.5	13.2	14.5	43.2	56.6
Saratoga	1.9	12.0	10.7	24.6	4.6	.4	38.1	43.1	67.7
Schoharie	.1	—	.6	.7	—	—	—	—	.7
Schuyler	—	—	—	—	.1	.2	.3	.6	.6
Steuben	—	—	—	—	.4	.5	.8	1.7	1.7
Sullivan	—	—	3.8	3.8	—	—	—	—	3.8
Tioga	—	—	—	—	.4	1.1	.5	2.0	2.0
Tompkins	.1	—	—	.1	.1	.4	.5	1.0	1.1
Warren	.5	11.8	9.0	21.3	2.8	.1	35.5	38.4	59.7
Washington	b	4.3	2.0	6.3	.9	.3	13.0	14.2	20.5
Total	68.3	57.8	75.7	201.8	62.9	67.0	302.5	432.4	634.2

[a] Counties with no production are omitted.
[b] Less than 50 cords.

Table 14.—Pulpwood production from roundwood in Pennsylvania, by county and selected species, 1977
(In thousands of standard cords)

County[a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Adams	—	—	0.5	0.5	—	6.2	3.1	9.3	9.8
Armstrong	—	—	—	—	—	.2	—	.2	.2
Bedford	—	0.5	7.2	7.7	—	14.5	28.1	42.6	50.3
Berks	—	—	—	—	—	.2	—	.2	.2
Blair	—	—	1.3	1.3	0.8	2.8	3.2	6.8	8.1
Bradford	—	—	3.1	3.1	7.6	6.7	14.8	29.1	32.2
Butler	—	—	—	—	—	1.4	.7	2.1	2.1
Cambria	—	b	b	b	—	—	b	b	b
Cameron	—	—	—	—	—	4.0	—	4.0	4.0
Carbon	—	—	b	b	.1	.4	.5	1.0	1.0
Centre	—	.8	b	.8	2.0	8.2	6.9	17.1	17.9
Clarion	—	—	—	—	—	1.1	2.3	3.4	3.4
Clearfield	—	2.0	1.5	3.5	1.8	18.7	8.2	28.7	32.2
Clinton	—	.4	.1	.5	2.7	24.8	13.3	40.8	41.3
Columbia	—	—	—	—	.4	1.2	1.7	3.3	3.3
Crawford	—	—	—	—	—	.7	.6	1.3	1.3
Cumberland	—	—	.1	.1	—	1.0	.5	1.5	1.6
Dauphin	—	—	—	—	.1	.2	.3	.6	.6
Elk	—	—	—	—	—	4.1	16.7	20.8	20.8
Erie	—	—	—	—	—	—	2.2	2.2	2.2
Fayette	—	—	.4	.4	—	.2	.6	.8	1.2
Forest	—	—	—	—	—	2.3	8.8	11.1	11.1
Franklin	—	—	.8	.8	—	7.0	3.9	10.9	11.7
Fulton	—	.3	1.6	1.9	—	3.2	3.0	6.2	8.1
Huntingdon	—	—	2.2	2.2	.1	7.6	5.4	13.1	15.3
Indiana	—	1.2	—	1.2	—	b	b	b	1.2
Jefferson	—	—	.1	.1	—	2.0	11.3	13.3	13.4
Juniata	—	—	.7	.7	—	2.4	1.5	3.9	4.6

(CONTINUED)

Table 14—Continued

County[a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Lackawanna	—	—	—	—	.3	1.2	1.6	3.1	3.1
Lancaster	—	—	b	b	—	.4	.2	.6	.6
Lebanon	—	—	—	—	b	.1	.1	.2	.2
Luzerne	—	—	—	—	.2	.8	1.0	2.0	2.0
Lycoming	—	—	—	—	4.4	16.2	13.8	34.4	34.4
McKean	—	—	—	—	—	—	19.7	19.7	19.7
Mifflin	—	—	b	b	—	.3	.2	.5	.5
Monroe	—	—	—	—	.3	1.0	1.4	2.7	2.7
Montgomery	—	—	—	—	—	b	—	b	b
Montour	—	—	—	—	.1	.5	.7	1.3	1.3
Northampton	—	—	—	—	b	.1	.1	.2	.2
Northumberland	—	—	—	—	b	b	.1	.1	.1
Perry	—	—	.3	.3	—	1.9	1.0	2.9	3.2
Pike	—	—	—	—	.4	1.4	1.9	3.7	3.7
Potter	—	—	—	—	2.4	1.8	27.0	31.2	31.2
Schuylkill	—	—	.9	.9	.2	10.2	2.4	12.8	13.7
Snyder	—	—	b	b	—	0.1	0.1	0.2	0.2
Somerset	—	b	0.2	0.2	—	4.5	3.9	8.4	8.6
Sullivan	—	—	—	—	6.0	3.4	10.9	20.3	20.3
Susquehanna	—	—	—	—	4.3	11.1	17.5	32.9	32.9
Tioga	—	—	.2	.2	4.4	6.4	19.8	30.6	30.8
Union	—	—	.1	.1	.2	1.7	1.4	3.3	3.4
Venango	—	—	—	—	—	9.5	3.8	13.3	13.3
Warren	—	—	—	—	—	5.5	11.0	16.5	16.5
Wayne	—	—	—	—	1.1	4.6	6.1	11.8	11.8
Westmoreland	—	—	b	b	—	.3	.5	.8	.8
Wyoming	—	—	b	b	1.5	2.8	4.1	8.4	8.4
York	—	—	2.4	2.4	—	2.2	—	2.2	4.6
Total	—	5.2	23.7	28.9	41.4	209.1	287.9	538.4	567.3

[a]Counties with no production are omitted.
[b]Less than 50 cords.

Table 15.—Pulpwood production from roundwood in Delaware, Maryland, and New Jersey, by state, county, and selected species, 1977

(In thousands of standard cords)

County[a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hard-woods	Total	
DELAWARE									
Kent	—	—	0.6	0.6	—	0.1	0.2	0.3	0.9
Sussex	—	—	30.8	30.8	—	1.8	1.7	3.5	34.3
Total	—	—	31.4	31.4	—	1.9	1.9	3.8	35.2
MARYLAND									
Allegany	—	0.6	2.9	3.5	—	19.2	14.4	33.6	37.1
Anne Arundel	—	—	3.3	3.3	—	—	—	—	3.3
Baltimore	—	—	1.7	1.7	—	.1	b	.1	1.8
Calvert	—	—	1.4	1.4	—	9.0	7.8	16.8	18.2
Caroline	—	—	3.3	3.3	—	.2	.1	.3	3.6
Carroll	—	—	2.0	2.0	—	.6	.1	.7	2.7
Charles	—	—	11.2	11.2	—	.4	.2	.6	11.8
Dorchester	—	—	5.6	5.6	—	—	.2	.2	5.8
Frederick	—	—	.2	.2	—	.9	.4	1.3	1.5
Garrett	—	.2	.9	1.1	—	—	—	—	1.1
Kent	—	—	.9	.9	—	.1	—	.1	1.0
Prince Georges	—	—	4.3	4.3	—	—	—	—	4.3
Queen Annes	—	—	.1	.1	—	—	—	—	.1
St. Marys	—	—	8.8	8.8	—	2.8	—	2.8	11.6
Somerset	—	—	12.8	12.8	—	—	—	—	12.8
Talbot	—	—	.1	.1	—	—	—	—	.1
Washington	—	—	1.4	1.4	—	1.0	.7	1.7	3.1
Wicomico	—	—	40.7	40.7	—	.1	—	.1	40.8
Worcester	—	—	18.5	18.5	—	—	—	—	18.5
Total	—	0.8	120.1	120.9	—	34.4	23.9	58.3	179.2
NEW JERSEY									
Atlantic	—	—	0.8	0.8	—	—	0.2	0.2	1.0
Cape May	—	—	1.5	1.5	—	—	.4	.4	1.9
Gloucester	—	—	1.5	1.5	—	b	.4	.4	1.9
Ocean	—	—	21.4	21.4	—	—	—	—	21.4
Total	—	—	25.2	25.2	—	b	1.0	1.0	26.2

[a]Counties with no production are omitted.

[b]Less than 50 cords.

Table 16.—Pulpwood production from roundwood in West Virginia, by county and selected species, 1977

(In thousands of standard cords)

County[a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hard-woods	Total	
Barbour	—	—	b	b	—	0.4	0.1	0.5	0.5
Berkeley	—	0.1	1.4	1.5	—	.4	.6	1.0	2.5
Boone	—	—	—	b	—	—	—	—	b
Cabell	—	—	.4	.4	—	—	—	—	.4
Fayette	—	—	—	—	—	—	.8	.8	.8
Grant	—	.3	2.9	3.2	—	18.0	9.8	27.8	31.0
Greenbrier	—	—	.9	.9	—	—	35.9	35.9	36.8
Hampshire	—	.6	13.8	14.4	—	16.2	9.3	25.5	39.9
Hardy	—	.3	2.8	3.1	—	3.0	2.8	5.8	8.9
Harrison	—	—	—	—	—	—	b	b	b
Jackson	—	.1	.8	.9	—	—	b	b	.9
Kanawha	—	—	b	b	—	—	—	—	b
Lincoln	—	—	b	b	—	—	—	—	b
Marion	—	—	b	b	—	—	—	—	b
Marshall	—	—	—	—	—	—	.2	.2	.2
Mason	—	.1	1.1	1.2	—	4.1	b	4.1	5.3
Mineral	—	.1	1.9	2.0	—	5.0	3.7	8.7	10.7
Monroe	—	—	1.5	1.5	—	—	10.7	10.7	12.2
Morgan	—	.1	2.6	2.7	—	1.6	1.2	2.8	5.5
Ohio	—	—	—	—	—	—	b	b	b
Pendleton	0.1	—	.2	.3	—	2.5	2.0	4.5	4.8
Pocahontas	.1	—	.2	.3	—	.9	1.3	2.2	2.5
Preston	—	—	.2	.2	—	—	.2	.2	.4
Putnam	—	—	.8	.8	—	—	—	—	.8
Raleigh	—	—	—	—	—	—	b	b	b
Randolph	—	—	.4	.4	—	.8	1.0	1.8	2.2
Ritchie	—	—	b	b	—	—	1.2	1.2	1.2
Summers	—	—	—	—	—	—	b	b	b
Taylor	—	—	b	b	—	—	—	—	b
Tucker	—	—	b	b	—	.3	.4	.7	.7
Upshur	—	—	—	—	—	—	b	b	b
Wayne	—	—	b	b	—	—	—	—	b
Wirt	—	—	2.3	2.3	—	2.5	1.1	3.6	5.9
Wood	—	—	2.2	2.2	—	2.5	7.1	9.6	11.8
Total	0.2	1.7	36.4	38.3	—	58.2	89.4	147.6	185.9

[a]Counties with no production are omitted.
[b]Less than 50 cords.

Headquarters of the Northeastern Forest Experiment Station are in Broomall, Pa. Field laboratories and research units are maintained at:

- Beltsville, Maryland.
- Berea, Kentucky, in cooperation with Berea College.
- Burlington, Vermont, in cooperation with the University of Vermont.
- Delaware, Ohio.
- Durham, New Hampshire, in cooperation with the University of New Hampshire.
- Hamden, Connecticut, in cooperation with Yale University.
- Kingston, Pennsylvania.
- Morgantown, West Virginia, in cooperation with West Virginia University, Morgantown.
- Orono, Maine, in cooperation with the University of Maine, Orono.
- Parsons, West Virginia.
- Princeton, West Virginia.
- Syracuse, New York, in cooperation with the State University of New York College of Environmental Sciences and Forestry at Syracuse University, Syracuse.
- University Park, Pennsylvania.
- Warren, Pennsylvania.

80: NE-61

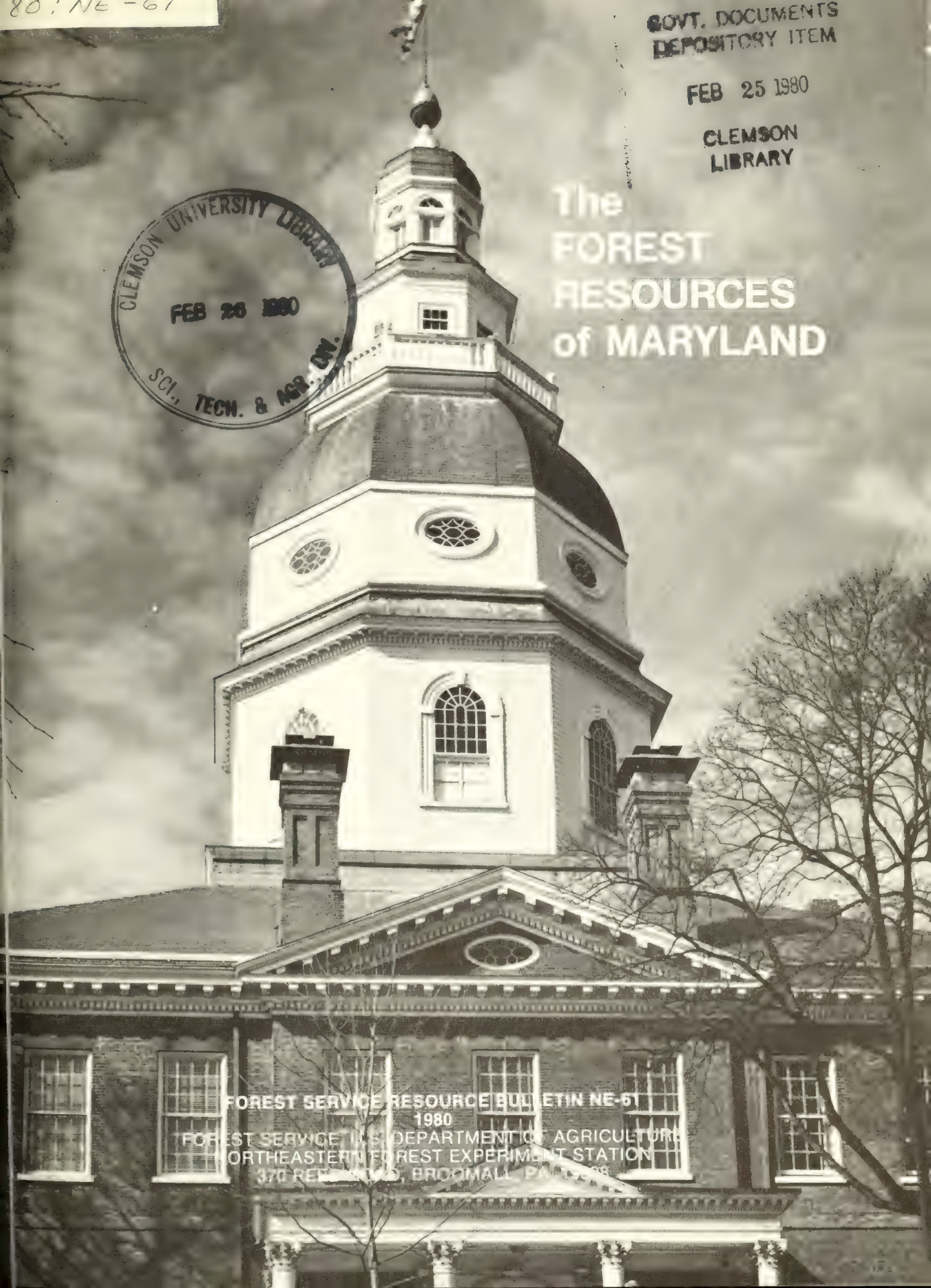
GOVT. DOCUMENTS
DEPOSITORY ITEM

FEB 25 1980

CLEMSON
LIBRARY

CLEMSON UNIVERSITY LIBRARY
FEB 26 1980
SCI., TECH. & AGR. DIV.

The FOREST RESOURCES of MARYLAND



FOREST SERVICE RESOURCE BULLETIN NE-61
1980
FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE
NORTHEASTERN FOREST EXPERIMENT STATION
370 REED ROAD, BROOMALL, PA 19008

Foreword

UNDER the authority of the Forest and Rangeland Renewable Resources Research Act of 1978, the USDA Forest Service conducts periodic inventories of and evaluates the forest resources of all states to provide up-to-date information about the forest resources of the Nation.

The first forest inventory of Maryland by the Federal Government was made in 1950 by the Northeastern Forest Experiment Station. A second survey was conducted by the same unit in the early 1960's and was completed in 1964. The third and latest survey was made in 1975 and 1976, also by the Northeastern Station. As in the previous surveys, the Forest Service had the cooperation and assistance of many individuals and agencies. Special thanks are due former State Forester Adna R. Bond and the personnel of the Maryland Forest Service of the Maryland Department of Natural Resources, especially Tunis Lyon, Jack Brodie, and Jim Burtis.

The third inventory of Maryland was directed by Carl E. Mayer, Resources Evaluation unit leader. Joseph E. Barnard was responsible for the design of the inventory and sample selection as well as for supervision of data compilation. John R. Peters supervised the aerial-photo interpretation and data collection by field crews. The field work was under the immediate supervision of Ronald L. Taylor and James M. Miller. The other field workers were:

David J. Alerich
Timothy J. Breneisen
William S. Cook
Eileen M. Doherty
Daniel J. Evans
Michael E. Glova
Kris A. Hasbrouck
Dennis R. Kline
David J. Lemonick
Susan N. Little
Kenneth M. Maleski
David T. Plunkett
Steven F. Resh
Robert A. Romans
Karen J. Sykes
Richard C. Whittaker
Michael S. Woodbury

David Dickson applied FINSYS (Forest Inventory System), a generalized data-processing system, to the specific data needs of the Maryland inventory, and produced summary tables for the state, geographic sampling units, and counties. Teresa M. Bowers assisted in the inventory design by performing all calculations necessary for sample-size determination and plot selection. She was responsible for the coordination of key punching and other data preparation tasks, and the final preparation and statistical check of tables for the report. Flora C. Clements prepared and balanced most of the statistical tables in the report.

James T. Bones, with the assistance of State personnel, collected and compiled the data on timber products output and timber removals. He was assisted in the compilation phase by David R. Dickson and Teresa M. Bowers. Carmela M. Hyland was responsible for administrative and secretarial services.

The authors and Joseph E. Barnard checked the consistency of the new inventory with previous inventories. The TRAS (Timber Resource Analysis System) forest-stand simulation model was used in this phase of the data analysis.

The photo-interpretation phase of this inventory was completed in November 1975, and the last field plot was measured in June 1976. Final computer output was available in September 1977. Users of this report who need more detailed information should contact: Resources Evaluation, Northeastern Forest Experiment Station, 370 Reed Road, Broomall, Pa. 19008.

Users are strongly advised to read carefully the definitions of forest survey terms and the section on the reliability of the estimates in the appendix of this report.

by Douglas S. Powell and Neal P. Kingsley

The FOREST RESOURCES of MARYLAND

Contents

HIGHLIGHTS 1
INTRODUCTION 2
THE THIRD SURVEY 3
Comparisons between surveys 4
Four geographic units 4
FOREST AREA 6
Forest-land ownership 7
Stand size 8
Forest-type groups 9
TIMBER VOLUME 10
Sawlog quality 11
Species 11
GROWTH AND REMOVALS 14
Change in the inventory 15
Net growth and removals 15
TIMBER PRODUCTS OUTPUT 15
Lumber and sawlogs 17
Pulpwood 18
Other timber products 20
The place of wood in Maryland's economy 22
TIMBER SUPPLY OUTLOOK 22
TIMBER MANAGEMENT OPPORTUNITIES 24
NONTIMBER FOREST RESOURCES 29
Water 29
Soil 30
Fish and wildlife 33
Outdoor recreation 37
LITERATURE CITED 40
APPENDIX 41
Definition of terms 41
Log-grade classification 45
Forest survey methods 48
Comparisons between inventories 50
Reliability of the estimates 51
Commercial tree species of Maryland 52
Index to tables 54
Tables 56
Metric equivalents of units used in this report 103

M. E. Warren photo

COVER PHOTO

Built in the 1770's with large timbers, presumably loblolly pine, the dome of the Maryland State House is the largest wooden dome in the country.

Abstract

The findings in this statistical and analytical report of the third forest survey of Maryland, completed in 1976, are based on remeasured 1/5 acre plots and both remeasured and new 10-point variable radius plots. The present status and trends in forest-land area, timber volume, and annual growth and removals are discussed. Timber products output by forest industries, based upon a canvass of industries in 1975, and the importance of timber to the economy of Maryland also are discussed. The report includes a discussion of the outlook for timber supplies through 2006, forest-management opportunities in the state, and the status and importance of the nontimber forest resources of Maryland.

The Authors

DOUGLAS S. POWELL, research forester, received a B.S. degree in forestry from the University of Michigan in 1971 and an M.S. degree in forest ecology from West Virginia University in 1976. He joined the Northeastern Forest Experiment Station in July 1971, and is now a Resource Analyst in the Northeastern Station's Resources Evaluation unit, located in Broomall, Pa.

NEAL P. KINGSLEY, research forester, received a B.S. degree in forestry from the University of New Hampshire in 1961 and an M.S. degree in forest economics from the same university in 1963. He joined the Northeastern Forest Experiment Station in August 1962, and is now Resource Analysis Group Leader in the Station's Resources Evaluation unit.

MANUSCRIPT RECEIVED FOR PUBLICATION 26 JUNE 1979

HIGHLIGHTS

- More than 2.5 million acres—40 percent of the land area—is commercial forest land. This is a decrease of almost 13 percent since the previous survey.
- There are an estimated 95,800 owners of the 2.3 million acres of privately owned commercial forest land.
- The average size of private, forested ownerships is 23.8 acres.
- Sawtimber stands predominate, covering 1.4 million acres or 56 percent of commercial forest land.
- Oak-hickory is the dominant forest type, occupying 46 percent of the commercial forest land, and accounting for 49 percent of the growing-stock volume.
- Growing-stock volume is 3.5 billion cubic feet, and the sawtimber component is 8.2 billion board feet.
- Seventy-seven percent of the growing-stock volume is in hardwood species, but loblolly pine is the single species with the most volume—470 million cubic feet.
- All species except sweetgum have increased in volume.
- In 1975, for growing stock statewide, hardwood removals were 72 percent of growth and softwood removals were 95 percent of growth.
- In 1975, sawlogs accounted for 55 percent of the roundwood production, followed by pulpwood with 32, veneer logs with 8, and other products with 5.
- Thirty-year projections show a slight decrease in commercial forest area, an increase in total inventory, and little change in total growth and removals.
- There are numerous opportunities to improve timber management, but private owner objectives, the moderately high ownership turnover rate, and the small size of ownerships must be dealt with to achieve this goal.
- Besides timber, Maryland's forests produce or affect other important resources such as water, soil, fish, and wildlife, and provide excellent opportunities for outdoor recreation.

INTRODUCTION

WHEN LEONARD CALVERT established the first settlement in 1634 at St. Marys City (St. Marys County), the entire land area of Maryland was forested except for about 5 percent in marshes around Chesapeake Bay. These forests were nearly all hardwood and certainly contained many mammoth trees. The forest resources have changed dramatically during these three centuries.

The early settlers viewed the forest as an adversary, something to be reduced or eliminated so that the land could be farmed. Fire was a commonly used method, and much more timber was destroyed than was used. As the population increased, more timber from land clearing went into such products as log cabins and rail fences. As cities and towns were built, demand increased substantially, and a stable market requiring timber beyond local needs developed. This was when exploitation of forests began. With abundant supply, only the choicest sections of the best trees were used. Poor transportation made logging costly, and stumpage values at that time were very low (Besley 1916).

As improved logging, transportation, and sawmill technology was applied, serious inroads were made on the forests. Areas that were first cutover to remove the best timber were visited again and again, and each time a lower grade of product was taken. Since young growth had no value, it received no consideration. It was not until 70 or 80 years ago that even limited attention was given to the practical application of forestry.

During the first few decades of this century, forest exploitation became forest conservation, and land use throughout the state began to stabilize. Western Maryland, with mountainous terrain and rocky hillsides, remained heavily forested with limited farming. In central Maryland, where the land is well drained and fertile, farming dominated; the forests generally were only on rocky ridges, hillsides, and stream banks. This area has long been the most urbanized of the state.

In the southern portion of the state, the land on hillsides or slopes or ravines, where soil erosion can be severe, remained in woodland or, if cleared, has been allowed to revert to woodland. On the lower Eastern Shore, many forests grew in low-lying areas that were too wet for cultivation but that supported tree growth quite well. The drier, sandy sites also supported good pine stands. The use of the land remained basically like this up until the 1960's when the population around Baltimore and Washington began to expand rapidly and land use began to shift again (see Forest Land Area).

Today's forests are the result of man's influence as well as the inherent nature of the land. Although a small state, Maryland has a greater diversity of land forms, climate, soils, and forests than any other state in the Northeast. This is attributable to its location as a Middle Atlantic coastal state and its elongated shape. It is 262 miles across, stretching over five physiographic provinces and touching three major forest regions (South, Central, and North). It is interesting that because of the shape of the state, Oakland (Garrett County) is closer, as the crow flies, to Canada than it is to Ocean City (Worcester County).

From a physiographic viewpoint, the largest province is the Coastal Plain. Lying east of the Fall Line, it is an easily recognized topographic feature than runs northeast from Washington, D.C. to Delaware (Fig. 1). The Coastal Plain, with altitudes ranging from sea level to around 100 feet, is characterized by low topographic relief with marshes and swampy tidal flats around Chesapeake Bay. Adjoining this province on the west is the Piedmont, an area of rolling uplands with altitudes ranging generally from 100 to 500 feet. Farther west is the Blue Ridge where the first of the Appalachian Mountains are encountered. The fourth province is the Ridge and Valley, which when viewed from the air shows a striking alternation of parallel ridges and valleys ending on the west with an imposing escarpment known as the Allegheny Front. The westernmost province, the Appalachian Plateau, is the most mountainous and contains Backbone Mountain, which at 3,360 feet is the highest point in the state. The slopes are steep and the terrain is deeply incised by winding stream valleys.

Accompanying these changes in physiography are changes in climate, soils and vegeta-

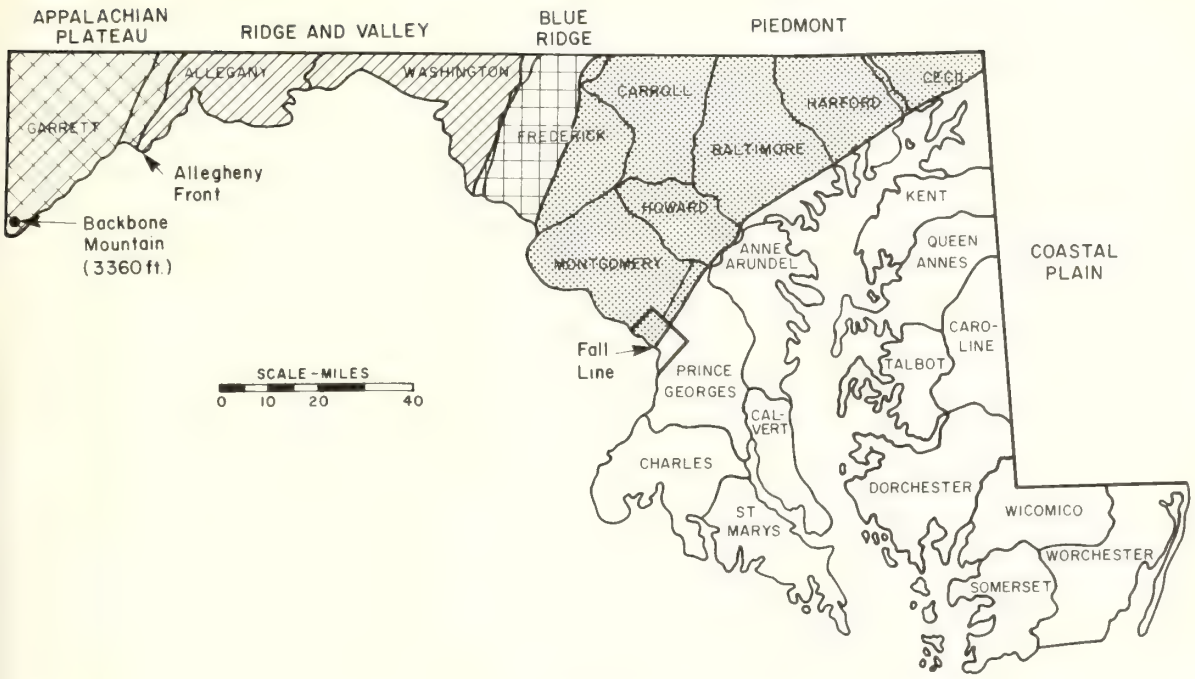


Figure 1.—The five physiographic provinces of Maryland.

tion. In the southeast the climate is mild and rainy, and the soils range from sands and sandy loams to silt loams—all resulting from marine deposits. The forests, especially on the Lower Eastern Shore, are similar to those found much farther south, including such species as baldcypress, loblolly pine, and sweetgum. Also present in this area is Atlantic white-cedar, a species that grows in a relatively narrow, patchy, coastal belt from Maine to Florida.

As you proceed west, the soils become less sandy and more clay loams are encountered. The climate is moderate in central Maryland, but in the higher elevations of the west, conditions are similar to those of the Northern States and Canada. The Ridge and Valley Province is the driest part of the state since most of the precipitation coming from the west is discharged west of the Allegheny Front. The forests of central Maryland are predominantly oak/hickory with some oak/pine and elm/ash/red maple. In the west, however, forests not unlike those found much farther north are common. The northern hardwood sugar maple/beech/yellow birch type is common here and northern conifers such as red spruce, white pine, and red pine are also present.

With this historical perspective and glimpse of the tremendous diversity offered by the "Old Line State," let's move on to a discussion of what the forest resources of Maryland are like now, and what changes they have undergone in the recent past and are likely to undergo in the near future.

THE THIRD SURVEY

In 1950, USDA Forest Service, in cooperation with other Federal and state agencies, conducted the first in this series of periodic forest inventories of Maryland (U.S. Forest Service 1955). The second inventory was taken in the early 1960's and completed in 1964 (Ferguson 1967). This report discusses the results of the third survey, which began in 1975 and was completed in 1976.

Comparisons between surveys

Since the 1950 and 1964 surveys many definitions and procedures have changed as the result of refinements and improvements in forest inventory and data-processing techniques. As a consequence, before any comparisons with the most recent information can be made, many of the published volume estimates from the previous surveys must be adjusted somewhat. These adjustments are reflected in the following figures for growing-stock volume (in millions of cubic feet):

Species group	*1950*	*1964*	*1976*	*Change (1964-1976)*
Loblolly, pond, and shortleaf pines	450.6	413.6	482.9	+ 69.3
Other softwoods	308.2	309.2	310.1	+ 0.8
Total softwoods	758.8	722.9	793.0	+ 70.1
White oaks	449.2	520.9	579.5	+ 58.6
Red oaks	488.8	578.2	654.0	+ 75.8
Yellow-poplar	275.8	317.3	350.6	+ 33.3
Sweetgum	231.9	228.6	221.2	− 7.4
Hickory	97.1	107.5	114.8	+ 7.3
Soft maples	136.9	146.8	280.6	+133.8
Other hardwoods	362.5	435.1	498.4	+ 63.3
Total hardwoods	2,042.2	2,334.4	2,669.1	+364.7
All species	2,801.0	3,057.3	3,492.1	+434.8

For sawtimber volume, adjustments for the broad species groups are reflected in the following figures (in millions of board feet, International ¼-inch rule):

Species group	*1950*	*1964*	*1976*	*Change (1964-1976)*
Softwoods	1,547.0	1,529.1	1,726.4	+ 197.3
Hardwoods	4,567.3	5,432.8	6,440.2	+1,007.4
All species	6,114.3	6,961.9	8,166.6	+1,204.7

The changes in the 1950 and 1964 data are for the most part either within the limits of the sampling errors or close to them. The changes make the softwood and hardwood totals more comparable for the three surveys by reflecting the 1976 standards as well as recognized changes in growth and removals. Changes for smaller species groups were made to reflect more accurately what has happened to that part of the timber resource in Maryland over the 26-year period. For a more detailed explanation of these changes, see Comparisons Between Inventories in the appendix.

IF YOU WANT TO COMPARE 1976 VOLUME ESTIMATES WITH COMPARABLE ESTIMATES FOR 1950 OR 1964, USE THE ABOVE FIGURES RATHER THAN THOSE PUBLISHED PREVIOUSLY. Many comparisons will require some simple arithmetic to derive a comparable figure for 1950 or 1964. For example, suppose we wanted to compare the softwood growing-stock volume in poletimber stands between 1964 and 1976. Going back to the published data for 1964 (Ferguson 1967), we find in Table 16 that the softwood volume in poletimber stands was 127 million cubic feet. This represented 20.1 percent of the softwood growing-stock total of 632 million cubic feet. To obtain our adjusted figure, we simply multiply the 1964 proportion by the adjusted total (from the above table) and get 145.3 million cubic feet. The calculations are: (127/632) (722.9) = 145.3. This new figure is the one to use for comparing to the corresponding 1976 figure of 235.3 million cubic feet found in Table 15 of this report. Contact the Resources Evaluation unit at the Northeastern Forest Experiment Station if you need further assistance in making comparisons.

Four geographic units

To provide better quality regional information, Maryland was divided into four geographic sampling units (Fig. 2). Since these units are identical to those of the 1964 survey, we can make some comparisons of inventories and analyze certain trends for portions of the state. Here are some area and population statistics for the state and the four units:

Maryland

COUNTIES: 23
LAND AREA: 6,330,240 acres
COMMERCIAL FOREST: 40 percent
POPULATION: 3,922,399[1]
RURAL POPULATION: 23 percent[1]
POPULATION DENSITY:
397 per square mile[1]
PER CAPITA INCOME: $3,512[2]

[1]U.S. Department of Commerce, Bureau of Census. 1971. 1970 census of population, number of inhabitants, Maryland. Final report PC(1)-A22 Maryland. Washington, D.C. 28 p.

[2]U.S. Department of Commerce, Social and Economic Statistics Administration, Bureau of Census. 1973. County and city data book 1972, a statistical abstract supplement. Washington, D.C. p. 225.

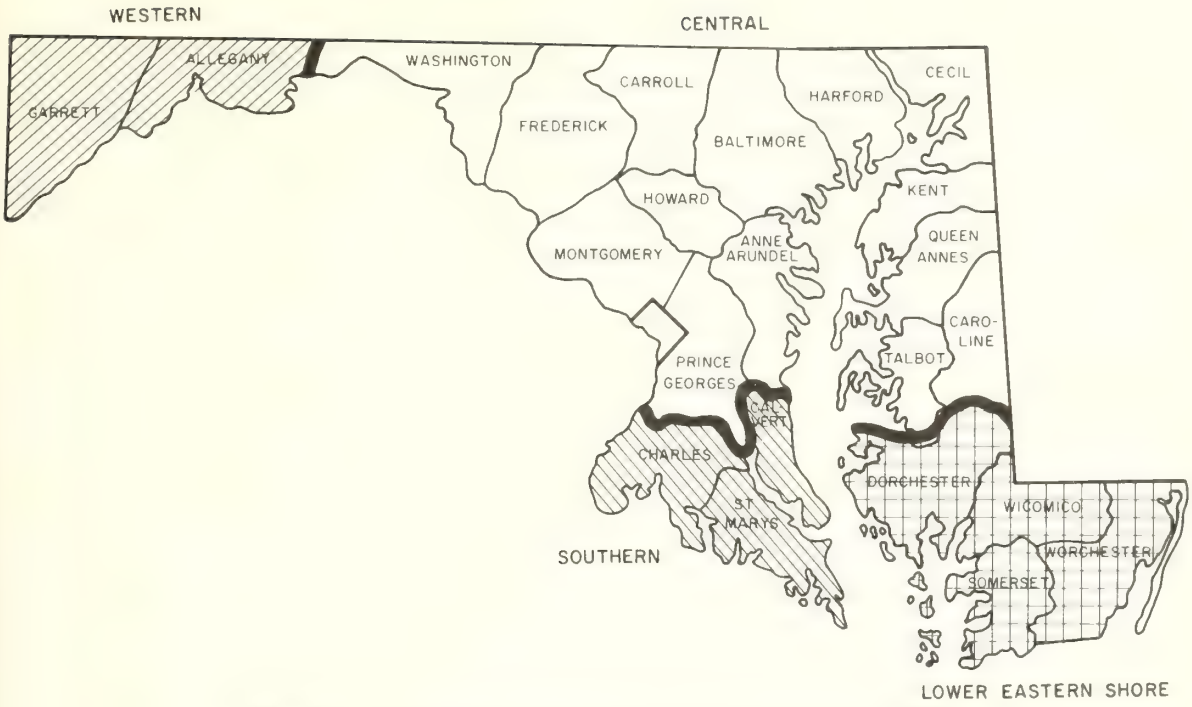


Figure 2.—The four geographic units of Maryland, 1976.

Lower Eastern Shore Unit

COUNTIES: 4
LAND AREA: 1,147,520 acres
COMMERCIAL FOREST: 46 percent
POPULATION: 127,007[1]
RURAL POPULATION: 74 percent[1]
POPULATION DENSITY:
71 per square mile[1]
PER CAPITA INCOME: $2,586[2]

The forests of this unit are dominated by loblolly pine stands growing on flat, poorly drained lowlands. Most of the softwood volume in the state is in this unit where forest industries are relatively active. The commercial forest land in this unit has the greatest volume per acre of all units. This unit also has the sparsest population.

Western Unit

COUNTIES: 2
LAND AREA: 695,680 acres
COMMERCIAL FOREST: 74 percent
POPULATION: 105,520[1]
RURAL POPULATION: 58 percent[1]
POPULATION DENSITY:
97 per square mile[1]
PER CAPITA INCOME: $2,410[2]

This is the most mountainous and heavily forested unit. Because of its relatively high elevation, this is the section of the state where most of the northern hardwoods, hemlock, and white pine are found. All of the coal reserves of Maryland are in this unit. This unit also has the lowest per capita income.

Central Unit

COUNTIES: 14
LAND AREA: 3,815,680 acres
COMMERCIAL FOREST: 29 percent
POPULATION: 3,574,124[1]
RURAL POPULATION: 19 percent[1]
POPULATION DENSITY: 599 per square mile[1]
PER CAPITA INCOME: $3,607[2]

This unit is by far the largest and most diverse. Since it has more people per square mile and a greater proportion of land in farms than any other unit, it has the lowest percentage of commercial forest land. Per capita income is much greater than in the other units.

Southern Unit

COUNTIES: 3
LAND AREA: 671,360 acres
COMMERCIAL FOREST: 56 percent
POPULATION: 115,748[1]
RURAL POPULATION: 86 percent[1]
POPULATION DENSITY: 110 per square mile[1]
PER CAPITA INCOME: $2,583[2]

This is the smallest unit and also the one with the highest percentage of rural population. Much of the land in this unit was farmland that was abandoned and invaded by Virginia pine, the most common softwood tree in the unit. Common hardwoods include oak, yellow-poplar, and sweetgum.

FOREST AREA

The total area of Maryland is 7,873,920 acres. Of this, 20 percent is classed as water by the U.S. Bureau of Census—14 percent for Chesapeake Bay (1,104,640). The remaining 6.3 million acres is considered land, making Maryland the 42nd largest state in the country.

The land area can be divided into two classes: nonforest and forest. There are 3.7 million acres—58 percent of the total land area—that are nonforest. This land is taken up by such uses as roads, parking lots, buildings, and farmland. But not all of these acres are void of trees or even miniforest stands. Trees that occupy less than an acre of land, or trees in median strips of highways, backyards, along streets, or in inner-city parks are not included in the statistics of this report. Yet these trees are very important and valuable for the Maryland city dweller. They provide shade and thus serve as natural air conditioners. They muffle noise and cleanse the air, thus reducing levels of these types of pollution. They provide food and shelter for squirrels and songbirds, which, in turn, provide recreational opportunities for members of urban communities. And they also provide physical and mental contentment—relief that is hard to come by in an environment of asphalt, glass and steel. So while we are not charged with inventorying the urban forest, we recognize it as a valuable resource and one that is used intensively by most Marylanders.

The other class, forest land, presently covers 42 percent of the land area of Maryland —a total of 2,653,200 acres. Forty percent of the land area—2,522,700 acres—is classed as commercial forest land, and it is land which we will be dealing with in this report. The remaining forest land is noncommercial and is primarily land withdrawn from timber utilization by statute or administrative order, such as state parks.

Total forest land has decreased by more than 10 percent since 1964. All of this loss occurred in commercial forest land, which dropped nearly 13 percent over this period. Noncommercial forest land actually increased by 52,100 acres or 66 percent.

The change in commercial forest-land area is distributed unevenly among the four geographic units. The Central Unit had the greatest loss of commercial forest land, dropping 22 percent since 1964. The Southern Unit had the next largest decrease—13 percent—followed by the Lower Eastern Shore Unit, which had a loss of only 3 percent. The Western Unit showed an increase of 6 percent, exemplifying the current trend in Appalachian areas where many marginally productive farms have been left to revert to woodland.

These changes seem inversely related to the changes in population that have occurred. From 1960 to 1970 the population rose from 3,100,689 to 3,922,399, an increase of 26.5 percent. For this period, this was the largest percentage increase in the Northeast and the sixth largest of the 50 states. The Western Unit had a population increase of less than 1 percent, and this is the unit registering an increase in forest-land area. The Lower Eastern Shore Unit had a population increase of 4 percent, and its forest-land acreage dropped only slightly. The other two units had large population increases and large decreases in forest-land area. The Southern Unit gained 28,435 residents—a 33-percent rise and the Central Unit gained 787,409 residents—a 28-percent rise.

While Maryland, on the average, is 40 percent commercial forest land, this land use is

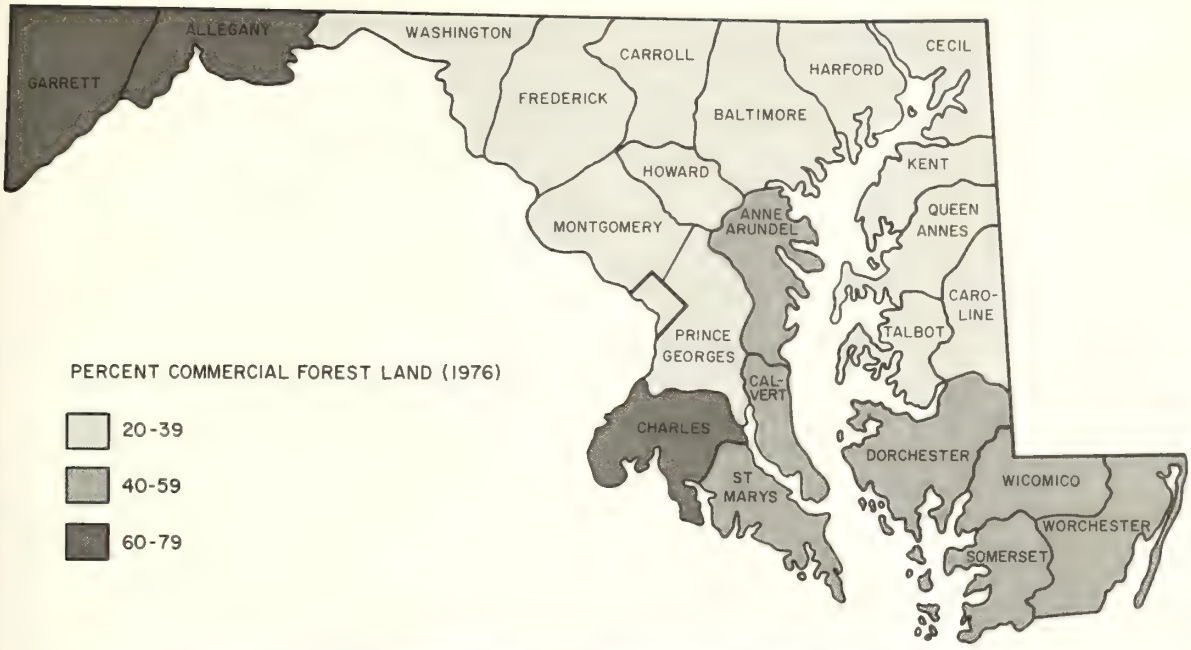


Figure 3.—The distribution of commercial forest land is uneven.

not distributed evenly. Carroll and Montgomery counties have the lowest percentages of commercial forest land—22 each—compared with Allegany County, which has the highest percentage at 76. Figure 3 shows the general distribution of commercial forest land across the state.

Forest-land ownership

Private ownerships make up 90 percent of the commercial forest land in Maryland. Of the 10 percent that is publicly owned—242,700 acres, 76 percent is administered by the state, and about one-half of this land is in the State Forest system.

The 2.3 million acres that are not publicly owned are in the hands of an estimated 95,800 private owners. Eighty-seven percent (83,100) of these are individuals; 6 percent (6,200) are corporations; 4 percent (3,600) are partnerships; and 3 percent (2,900) are clubs, youth organizations, churches, and similar associations. The average size of a private ownership of commercial forest land is 23.8 acres, but ownerships range in size from 1 to more than 50,000 acres. Smaller ownerships, fewer than 10 acres, account for the majority (55 percent) of the private owners, but they only amount to 7 percent of the private commercial forest land.

The individuals owning forest land have diverse occupations. Of the total estimated number of 83,100, 20 percent are skilled laborers, 16 percent are retired, 14 percent are white collar workers, 13 percent are farmers, and 11 percent are professionals. In acreage owned, farmers own the largest share—406,700 acres or 25 percent of the individual total; the retired sector is second with 274,200 acres or 17 percent.

Of the total number of corporate owners, nonindustrial businesses and real estate firms account for 54 and 25 percent, respectively. Less than 0.5 percent are forest industries. On an acreage basis, however, real estate firms own 32 percent of the corporate total (of 417,400 acres), forest industries own 26 percent, corporate farms hold 14 percent, and nonindustrial businesses own 8 percent. The average size of corporate ownership of woodland ranges from 11 acres for nonindustrial business to more than 2,200 acres for forest industry.

These estimates of numbers of owners and the amount of commercial forest land they own are based on the responses to questionnaires that were sent to a sample of forest

Figure 4.—Percent of commercial forest land area, by stand size, 1950, 1964, and 1976.

owners in Maryland. The results of this ownership study will be published separately.

Some of these results give indications of how much timber is or will actually be available from these private woodlands. Only 22 percent of the private owners have harvested timber, but they own 53 percent of the forest acreage. Many owners who have not harvested are not opposed to harvesting, but restrictions such as low volume, insufficient area, and immature timber have prevented them from cutting thus far. Two of the most common reasons that woodland owners have for cutting were that they needed money or that the timber was mature. Only an estimated 1,600 owners (2 percent) consider timber production as their primary reason for owning forest land, and they own an estimated 268,300 acres of commercial forest land—12 percent of the private total.

Stand size

Since the initial survey in 1950, sawtimber stands have dominated in the state, followed by poletimber stands, and sapling-seedling stands and nonstocked areas (Fig. 4). This most recent survey showed that sawtimber stands occupy 56 percent—1,413,100 acres—of the commercial forest land. Poletimber stands occupy 26.4 percent—665,500 acres; and sapling-seedling stands and nonstocked areas occupy 17.4 percent (438,200) and 0.2 percent (5,900), respectively.

Since the 1964 survey, the proportion of sawtimber stands has dropped by 6 percent, this loss being picked up entirely by the sapling-seedling stands and nonstocked areas (Fig. 4). The proportion of poletimber stands has varied little over this period. In actual acreage, however, sawtimber stands decreased by 380,300 acres, poletimber stands decreased by 88,400 acres, and other stands increased by 105,900. Most of the drop in sawtimber and poletimber stands occurred in the Central Unit while most of the increase in other stands occurred in the Western Unit.

In a regulated hardwood forest, that is, an intensively managed forest that produces a steady and continual supply of sawlogs, the optimum distribution of stand sizes is 50 percent in sawtimber, 30 percent in poletimber, and 20 percent in sapling-seedling stands (Liscinsky 1978). The situation in Maryland was closest to this ideal in 1950 (Fig. 4). By 1964, the sawtimber stands had increased to 62 percent, mainly at the expense of the sapling-seedling stands. This indicates that cutting was less intense than in a regulated situation, allowing more of the smaller size stands to move into larger size classes. Since 1964, this trend apparently has been reversed, and the distribution is once again approaching this theoretical ideal.

With the absence of natural disasters since 1964, this reversal can be attributed to the activities of man in the forest. More sawtimber stands have been cut and, through either natural or artificial regeneration, transformed into sapling-seedling stands. Such activity could be the result of efforts by State, consulting, and industrial foresters to improve the level of forest management in Maryland.

Forest-type groups

Because of the diversity of the forests of Maryland, a total of 32 forest types were encountered in this survey. These were assigned to eight forest-type groups. Figure 5 gives a breakdown of the commercial forest-land area by group. Growing-stock volume is similarly distributed (Fig. 6).

Oak/hickory. The oak/hickory group dominates all areas of Maryland except the Lower Eastern Shore. The eight forest types composing this group account for 1.2 million acres of commercial forest land. These types are dominated by upland oak species but the forest type with the most acreage in the group is sweetgum/yellow-poplar.

Loblolly and shortleaf pine. This group accounts for nearly all of the softwood acreage in Maryland, but its 522,000 acres account for only 21 percent of the commercial forest land in this hardwood-dominated state. The majority of this acreage is in loblolly pine—295,000 acres—with Virginia pine a close second at 217,900 acres. The remaining acreage in this group is covered by pitch pine and eastern redcedar types. The loblolly pine type dominates the Lower Eastern Shore Unit while the Virginia pine type is more common to the other three units.

Elm/ash/red maple. The five types in this group cover 322,700 acres with the two red maple types accounting for 73 percent of this area. The black ash/American elm/red maple type covers 54,800 acres, or 17 percent of this group, while the two streambank types, river birch/sycamore and willow, make up the remaining 10 percent.

Maple/beech/birch. This fourth most plentiful group—accounting for nearly 200,000 acres—is most heavily concentrated in the higher elevations in western Maryland. The mixed northern hardwood type covers 100,900 acres and is dominated by such species as basswood, white ash, sweet birch, sugar maple, and northern red oak. The sugar maple/beech/yellow birch type, composed almost entirely of the first two species, accounts for one quarter of the group's acreage. Two other high-value types, black cherry and black walnut, cover about 48,100 acres.

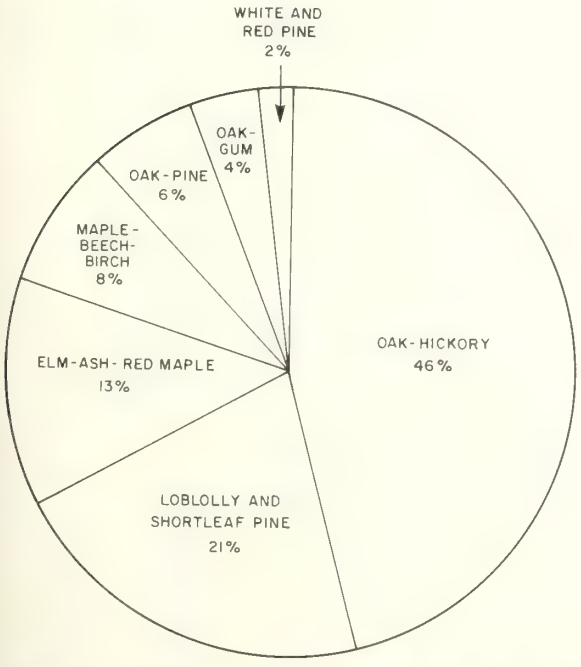


Figure 5.—Percent commercial forest land area, by major forest-type group, Maryland, 1976. (Spruce/fir percentage is less than 0.5 percent.)

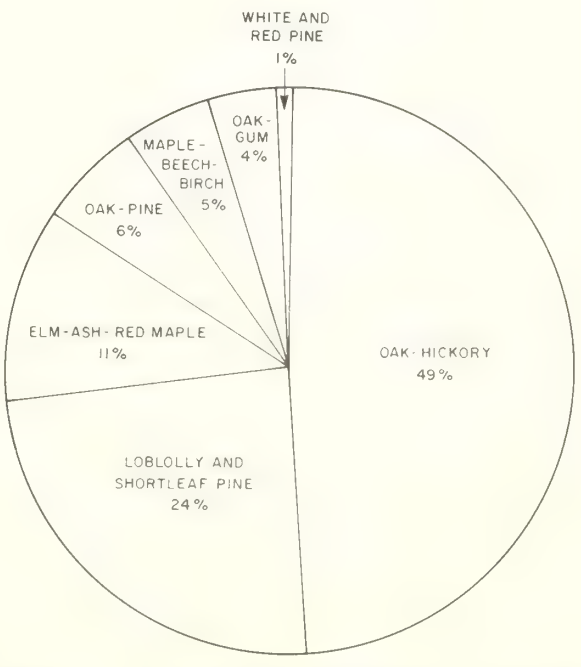


Figure 6.—Percent of growing-stock volume, by major forest-type group, Maryland, 1976. (Spruce/fir percentage is less than 0.5 percent.)

Mistaken for a swamp white oak until recently, the Tuckahoe Oak is the national champion overcup oak. It is located in the Tuckahoe State Park.

Mike Walsh photo

Oak/pine. This group covers 163,100 acres of commercial forest land and is most common in eastern Maryland. The Virginia pine/southern red oak type accounts for more than two-thirds of the group—111,200 acres scattered throughout the state except for the Lower Eastern Shore. There, the loblolly pine/hardwood type prevails in this group, accounting for nearly 50,000 acres.

Oak/gum/cypress. This bottomland hardwood group covers nearly 100,000 acres and is most commonly found in tidal areas around Chesapeake Bay. Not surprisingly, the Lower Eastern Shore Unit contains over one-half of the group's acreage, and this is the only area of the state where baldcypress is found. Sweetgum is an important species in this group. The sweetgum/willow oak type makes up 72 percent of the group's area. The swamp chestnut oak/cherrybark oak type covers the remainder. These types are not found in the Western Unit.

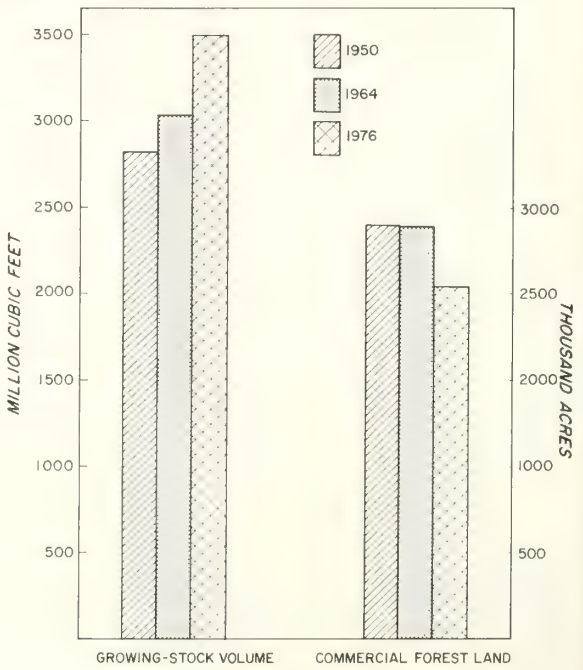
White and red pine. There are only 43,400 acres of this group in Maryland, and the white pine type accounts for 57 percent. The three other types—red pine, white pine/hemlock, and hemlock—split the remaining area evenly. There is considerable native white pine, but all of the red pine as well as much of the white pine is planted. This group is confined to the western areas of the state.

Spruce/fir. There are only about 11,200 acres in the spruce/fir group in Maryland. It is found only in the Western Unit and only at the highest elevations. All of the spruce/fir areas encountered by our field plots had been planted, either to white or Norway spruce.

TIMBER VOLUME

While the area of commercial forest land has been declining over the last quarter century, the volume of timber growing on that land has been rising steadily (Fig. 7). In 1950,

Figure 7.—Growing-stock volume and commercial forest land area of Maryland, 1950, 1964, and 1976.



Maryland had about 2.8 billion cubic feet of growing stock. By 1960, the total had climbed to 3.1 billion, and in 1976 the figure was 3.5 billion. This is nearly a 25-percent increase from 1950 to 1976. Sawtimber volume increased at a faster rate, rising by 34 percent since 1950. The total in 1950 was 6.1 billion board feet; in 1964 it was 7.0 billion; in 1976 it was 8.2 billion.

Because volume has been increasing on a shrinking land base, the average volume per acre has been increasing. In 1950, the average acre of commercial forest land had a net growing-stock volume of 967 cubic feet and a net sawtimber volume of 2,111 board feet. In 1964, these averages had risen to 1,060 cubic feet and 2,413 board feet. The latest survey shows them to be even higher at 1,384 and 3,237, respectively. While sawtimber stands dominate in the state and account for most of the increase, the sapling-seedling and pole-timber stands had the largest percentage increases.

Besides the 3.5 billion cubic feet of net volume in growing-stock trees, there are almost 400 million more cubic feet of net volume in cull trees. There are 285 million net cubic feet in rough trees. These are trees that are too crooked or misshapen to be considered growing stock. And there are 111.7 million net cubic feet of sound wood in trees that contain too much rot to be classed as growing stock. In Maryland, about 16 percent of all trees larger than 5.0 inches in diameter at breast height (dbh) are either rough or rotten. For hardwoods, about 1 of 5 trees is a cull while in softwoods only 1 of 25 is a cull. Compared to the situation in 1964, this shows a slight improvement in softwoods but an increased proportion of hardwood culls.

Sawlog quality

The volume of softwood sawtimber in Maryland is 1.7 billion board feet. Of this, 21 percent is Grade 1. 12 percent is Grade 2 and 67 percent is Grade 3. Pine sawlog quality has improved since 1964 when only 3 percent of the pine sawtimber volume was Grade 1, 14 percent was Grade 2, and 83 percent was Grade 3. This improvement is due to residual trees growing larger and shedding their branches and to improved management of loblolly pine on the Lower Eastern Shore.

Indeed, the softwood quality is best in the Lower Eastern Shore Unit, where 28 percent of the pine sawtimber volume is Grade 1. This is mainly loblolly pine, a species that prunes itself rapidly early in life, yielding logs with few knots and, therefore, higher quality. The other units, in descending order of pine quality, are: Central, Southern, and Western. Most of the pine in these units is Virginia pine, which is a very poor natural pruner.

Hardwoods are graded by standards very different from pines, so the situation is not comparable. Twelve percent of the 6.4 billion board feet of hardwood sawtimber volume is Grade 1, 20 percent is Grade 2, 44 percent is Grade 3, and 24 percent is in tie and timber material. This seems a slight improvement over 1964 when 9 percent was Grade 1, 17 percent was Grade 2, 35 percent was Grade 3, and 39 percent was in tie and timber material.

The differences between units are not as large for hardwood quality as for softwood quality. The state, on average, has 32 percent of its hardwood sawtimber volume in Grades 1 and 2. The Central Unit is best in this respect with 36 percent. The Western Unit is worst with only 20 percent. The Southern and Lower Eastern Shore Units both have 30 percent of their hardwood sawtimber volume in these grades.

The best way of improving hardwood quality is through better forest management. This entails removal of low-grade material so that the growth of the stand will be on the remaining higher quality trees. Removal of these poorer stems will also allow the residual trees to grow larger faster. Thus they will meet the minimum diameter specifications for Grade 1 and 2 sawlogs in a shorter period of time.

Species

The growing-stock volume of Maryland is 23 percent softwood—793 million cubic feet—and 77 percent hardwood—2.7 billion cubic feet. In 1950, the softwood component amounted to 27 percent and by 1964 it was down to 24 percent, so the trend is toward proportionately fewer softwoods and more hard-

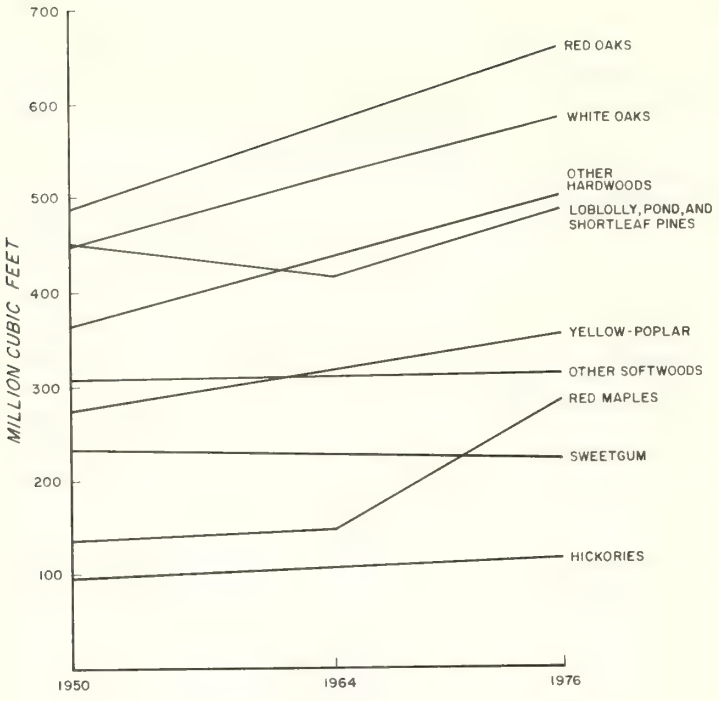


Figure 8.—Growing-stock volume in Maryland, by species, 1950 and 1976.

woods. This is also true for sawtimber volume. This is interesting in that the original forests of Maryland were nearly all hardwood; so the proportion of softwoods has been increased by the activities of man. The successional trend of the pine sites of the state is back toward hardwood species, and the pine will be maintained only by the conscious efforts of landowners and land managers.

Softwoods. The softwoods are dominated by the 470 million cubic feet of loblolly pine. This desirable southern pine, found in Maryland principally on the Lower Eastern Shore, is the species with the most volume in this predominantly hardwood state (see box). It accounts for 14 percent of the total growing-stock volume and 59 percent of the softwood volume. Because of its high growth rate and usefulness in many products, loblolly pine has received the most attention from a management standpoint. Loblolly pine was being overcut from the late 1940's through the mid-1960's. The inventory was steadily decreasing, and shortages of pine on the Eastern Shore were certain to occur unless something was done. After the results of the second survey were published (Ferguson 1967), and the situation became known, corrective actions were taken. Due to efforts by industry, private landowners and the Maryland Forest Service, the overcutting slowed, stopped, and growth began to exceed removals. Because cutting was reduced and more intensive management was applied, loblolly pine, along with its southern associates of pond and shortleaf pines, has increased in volume by 17 percent since 1964 (Fig. 8).

THE TOP TEN

Here are the ten species that dominate the timber resource of Maryland:

		Million cubic feet	*Percent of total*
1.	Loblolly pine	470	14
2.	White oak	368	11
3.	Yellow-poplar	351	10
4.	Red maple	279	8
5.	Virginia pine	237	7
6.	Sweetgum	221	6
7.	Northern red oak	182	5
8.	Chestnut oak	171	5
9.	Black oak	155	4
10.	Scarlet oak	136	4
	Total	2,570	74

The other major softwood species in Maryland is Virginia pine. At 237 million cubic feet, it ranks fifth in the state. Virginia pine is found throughout Maryland but most is concentrated in the Central Unit. Its volume, along with the relatively small volumes of the other softwoods (white pine, pitch pine, eastern redcedar, red spruce, baldcypress, hemlock, and others), has changed little since 1950. The reason for this is that growth and removals of these species have remained very close (Fig. 9).

Hardwoods. Hardwood volume has risen by nearly 32 percent since 1950, and by 16 percent since 1964. This is attributable to annual growth exceeding annual removals for the period and thus the difference, or net change, has been added on every year. This net change is due primarily to the maturing of Maryland's second- and third-growth stands. Ingrowth (the net volume of trees that become poletimber size) and accretion (the net growth on the initial inventory) have increased the volumes per acre significantly and removals simply have not kept pace.

For convenience, the more than 50 hardwood species found in Maryland have been combined into seven groups. The red oaks are most common and the volumes of the nine red oak species in Maryland total 654 million cubic feet, an increase of 34 percent since 1950 (Fig. 8). Northern red, black, and scarlet oak account for 72 percent of this volume. Fifty-six percent of the red oak volume is in the Central Unit, and 21 percent is in the Western Unit. The remainder is split evenly between the Southern and Lower Eastern Shore Units.

The white oaks are the second largest group, containing 580 million cubic feet, a 29 percent rise since 1950. In this group of seven species, white oak accounts for 64 percent of the volume, or 368 million cubic feet, and is the most abundant hardwood species in the state. Chestnut oak, which ranks eighth in volume in Maryland with 171 million cubic feet, has 29 percent of the white oak group's volume. The white oaks are distributed similarly to the red oaks, except they are concentrated a little less heavily in the Central Unit and proportionately more so in the Southern and Lower Eastern Shore Units.

Other hardwoods, a group that includes such species as blackgum (20 percent), beech (19 percent), white ash (12 percent), sycamore, sugar maple, and black locust (7 percent each), has over 18 percent of the hardwood volume—498 million cubic feet. This mixture of species has increased in volume by 38 percent since 1950, mainly because there are few markets for many of these species. About half

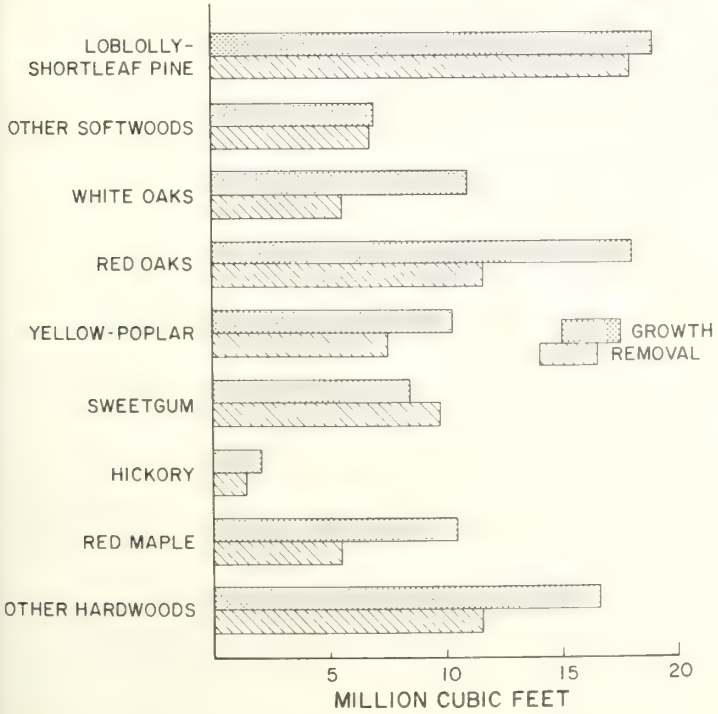


Figure 9.—Average annual growth and removals of growing stock in Maryland, by species, 1950-1976.

of the volume of this group is in the Central Unit, the remainder is nearly evenly divided among the other three units.

Yellow-poplar, with 351 million cubic feet, has enough volume to be a separate group. It is the second most abundant hardwood, and has increased in volume by 27 percent since 1950. Seventy-seven percent of the volume of this straight and fast growing species is in the Central Unit, commonly occurring on the north and east-facing slopes of mesic sites. Eighteen percent of the yellow-poplar is in the Southern Unit, and very little is found in the Lower Eastern Shore or Western Units.

The soft maple group, nearly 100 percent of which is red maple, has increased in volume most dramatically since 1964—up over 90 percent (Fig. 8). In 1950 and 1964, the red maple resource was very small and immature. In 1964, 76 percent of the red maple volume was in trees less than 11.0 inches dbh, and many stands had significant numbers of red maple saplings. As stands were cut, the red maple was left to grow relatively free of competition. So in the absence of demand, rapid growth was attained on standing timber, especially on sawtimber trees. But there also was a big increase in the smaller trees. While the proportion of volume in poletimber trees dropped to 49 percent in 1976, the volume in this smaller material nearly equals the total for red maple in 1964. Ingrowth was thus substantial as the red maple filled holes left by previous occupants of cut stands. So it is not surprising to find most of the red maple—42 percent—in the Lower Eastern Shore Unit, often in cutover stands. It is also the most common hardwood in this unit.

Sweetgum, at 221 million cubic feet, is the only species that has decreased in volume since 1950—down about 5 percent. This is attributable to removals exceeding growth for this highly desirable species. This typically southern and bottomland hardwood is found most frequently in the Lower Eastern Shore Unit, followed by the Central and Southern Units. It does not occur naturally in western Maryland, where the climate is too cold.

The hickories form the seventh hardwood group and have a growing-stock volume of 115 million cubic feet. Hickory volume is up 18 percent since 1950. Over two-thirds of the volume (68 percent) is in the Central Unit. The Western and Southern Units each contain 15 percent of the hickory volume with the remaining 2 percent found on the Lower Eastern Shore.

This national champion white oak, known as the Wye Oak, is a splendid example of Maryland's state tree. It is located in Wye Oak State Park in Talbot County.

Mike Walsh photo

GROWTH AND REMOVALS

To understand how the inventory changes, we compare the average annual growth with the average annual removals—the growth of wood on trees versus the volume removed from the inventory through cutting and changes in land use. The volume of growing stock in Maryland has increased by 667 million cubic feet since 1950, and the sawtimber component has increased by 2 billion board feet. This increase was due almost entirely to a slight de-

cline in timber harvesting statewide since 1950 (see Timber Supply Outlook). In 1952, actual timber removals in Maryland stood at 64 million cubic feet compared with 58.9 million in 1975 (Table 27).

Change in the inventory

The annual change in growing-stock and sawtimber volume is equal to net growth less timber removals. Net growth is the sum of several factors. The first of these is accretion and ingrowth. The sum of these is gross growth. Net growth is gross growth less changes in merchantability (cull-increment and mortality). It is these components of net growth that the forester seeks to manipulate through forest management.

An unusual change in any one of these factors can cause a substantial change in the annual inventory. For example, a sudden insect attack may increase mortality or cull increment. A sudden increase in timber demand may increase timber removals, which, in turn, could reduce the rate of increase in the inventory.

From 1950 to 1975, gross growth of growing stock averaged 125 million cubic feet per year (Table 20). Of this, 93.3 million or 75 percent of gross growth was growth on the initial inventory. Ingrowth accounted for 31.7 million cubic feet or 25 percent of gross growth.

Cull increment is the volume that became rough or rotten, and growing-stock mortality is the volume of growing-stock trees that die. Together, cull increment and mortality reduced gross growth by 21.7 million cubic feet per year or about 17 percent. Thus during this period Maryland produced 103.3 million cubic feet of growing stock annually. Of this volume, an average of 77.6 million was removed for products or in land use changes such as highways and park land. So during the past quarter century, Maryland added an average of 25.7 million cubic feet to its growing stock inventory each year.

Net growth and removals

During the period from 1950 to 1975, average annual growth exceeded average annual removals by 33 percent. For softwoods, the margin of average annual growth over removals was much closer at only 5 percent. During the 25 year period, the average annual growth of hardwoods exceeded removals by 46 percent.

Figure 9 shows growth and removals for major species for the last quarter century. Only one species, sweetgum, was being overcut during this period. Two other groups, other softwoods and loblolly-shortleaf pine, had removals of 99 and 94 percent of growth, respectively. Besides these three, the other species have growth well in excess of cut. The white oaks are in least danger of overcutting since their removals are only 50 percent of growth.

Although these 26-year averages appear encouraging statewide, the trend-level situation in 1975 showed softwoods being removed faster than they were growing in the Central and Western Units, while hardwood removals exceeded hardwood growth in the Southern and Western Units. The large amount of land clearing and loss of commercial forest land to nonforest land uses is perhaps the primary reason that removals exceeded growth in the Central and Southern Units. The volume of growing stock on land that has been cleared or otherwise changed from commercial forestland use during the period between inventories is considered as timber removals. In the Western Unit, timber is a more important component of the local economy than in the less timbered farm and urban areas to the east. There are many small sawmills and a large woodpulp mill in western Maryland that require steady supplies of raw material. Also, the annual net growth per acre is low in this region, so it does not take too high a level of removals before overcutting occurs.

TIMBER PRODUCTS OUTPUT

The output of timber products and timber removals data shown in Tables 25 through 27 should not be confused with the estimates of annual timber removals shown in Tables 20 through 22. Tables 25, 26, and 27 are based on the results of a 100-percent canvass of all primary wood-product manufacturers that were operating in Maryland in 1975. The results of utilization studies of recent logging operations also were used in compiling this information.

These tables will be the basis of the discussion in this section. Tables 20, 21, and 22 were developed from remeasurement of permanent sample plots and represent 1976 growth and removals as indicated by the trend between 1963 and 1975.

The output of timber products in Maryland from all sources totaled 54.4 million cubic feet in 1975, a decrease of 23 percent from the total output of 70.5 million cubic feet in 1963. From tables 25 and 26 the 1975 total can be broken down:

Source	*Million cubic feet*	*Percent*
Softwood growing stock	15.6	29
Hardwood growing stock	23.4	43
Total growing stock	39.0	72
Other sources	4.2	7
Total roundwood output	43.2	79
Plant byproducts	11.2	21
Total, all sources	54.4	100

The other sources mentioned include trees that are less than 5.0 inches dbh, tree tops and limbs from commercial forest areas, any material from noncommercial forest land or nonforest land such as fence rows and suburban areas, rough and rotten trees, and salvable dead trees.

In 1975, softwoods made up 43 percent of the total output and 42 percent of the roundwood output (18 million cubic feet). Hardwoods made up 57 percent of the total output and 58 percent of the roundwood output (25 million cubic feet). Compared with 1963, total softwood output decreased by 15 percent while the total hardwood output decreased by 28 percent.

If we look at total roundwood output by product and species group, we see some interesting changes from 1963 to 1975. The output from roundwood decreased by 31 percent with the softwood component decreasing by 25 percent and the hardwood component by 35 percent. Most of the softwood drop occurred in sawlog production where softwoods decreased by 61 percent compared with a 22-percent hardwood decrease. Softwoods registered the

Figure 10.—Lumber production in Maryland, 1869-1975.

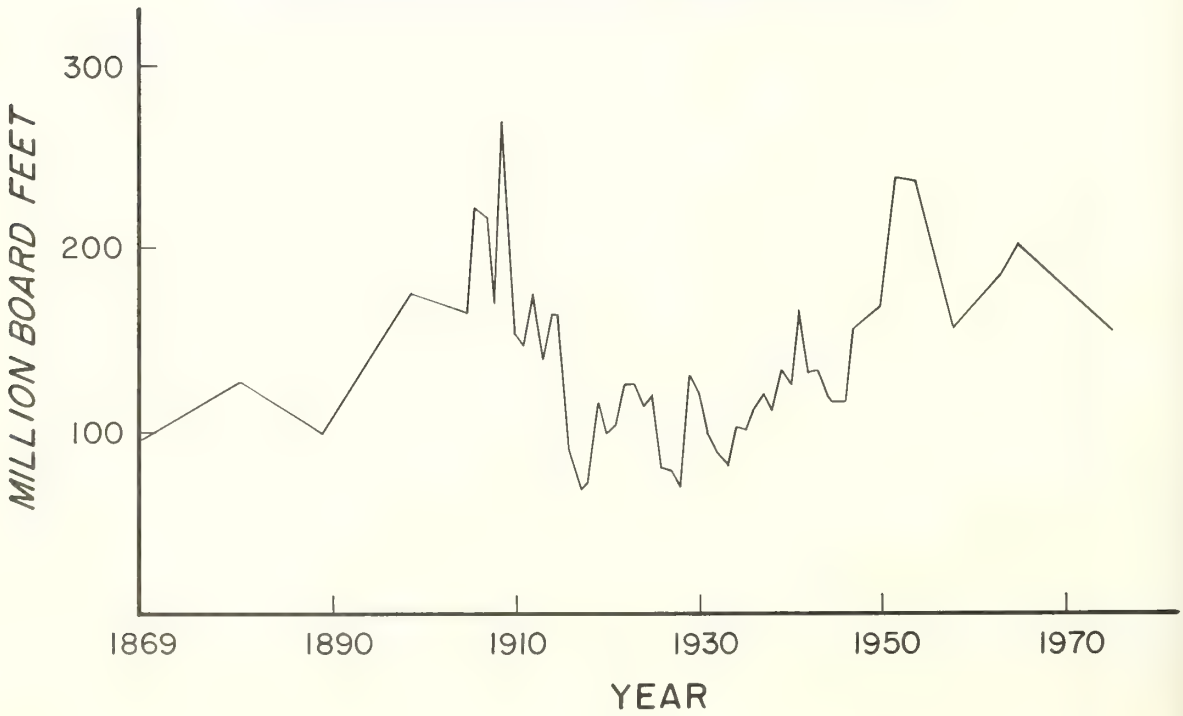
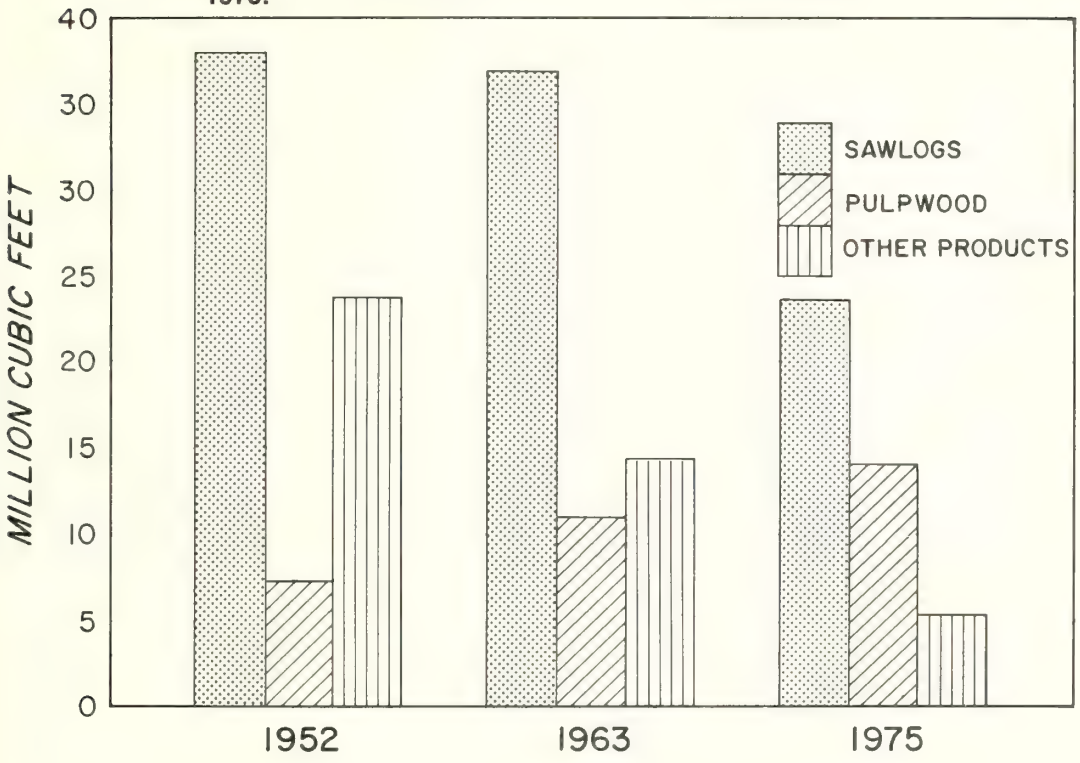


Figure 11.—Timber products output for roundwood in Maryland, by major product, for 1952, 1963, and 1975.



only increases in roundwood output, showing a 52 percent rise in pulpwood and a jump of nearly 1,150 percent (from 222,000 to 2,770,000 cubic feet) in veneer logs and bolts with the establishment of the state's only softwood veneer mill. In 1963 lumber was the primary softwood product while in 1975 more softwood went into pulpwood than any other product. The changes in industrial roundwood production are discussed at greater length in "The Timber Industries of Maryland" (Bones and Brodie 1977). The 1975 roundwood production in Maryland from all sources by product is:

Product	*Million cubic feet*	*Percent*
Sawlogs	23.6	55
Pulpwood	14.0	32
Veneer logs and bolts	3.6	8
Piling	1.2	3
Other industrial	0.4	1
Fuelwood	0.4	1
Total	43.2	100

Lumber and sawlogs

Lumber production in Maryland reached its highest level in 1909—268 million board feet produced by 721 sawmills (Fig. 10). Production fell off sharply to a record low of 68 million board feet in 1917. It climbed to 238 million board feet in 1952 and has generally decreased since then. Lumber production for 1975 was estimated at 156 million board feet based on sawlog receipts (Bones and Brodie 1978). In that year there were 91 sawmills operating, producing an average of 1.7 million board feet of lumber a year. The trend in Maryland, as in many other states, is toward fewer mills with higher annual production levels.

Sawlog production has always dominated the timber output of Maryland, but this appears to be lessening. Figure 11 compares sawlog production with pulpwood and other product production for 1952, 1963, and 1975. Sawlog production in 1952 and 1963 was 37.7 and 36.9 million cubic feet, respectively. By 1975, sawlog production, while still greater than all

Sawlog production accounts for the greatest use of Maryland's timber resource.

Maryland Forest Service photo

other products combined, had dropped substantially to 23.6 million cubic feet. With pulpwood production continuing to increase, the gap between sawlog and pulpwood production narrowed considerably. If this trend continues, pulpwood may soon relegate sawlogs to secondary importance.

The species composition of sawlog production also has changed. Figure 12 shows that loblolly pine, the primary softwood sawlog species, has declined from over one-half of the production in 1954 to less than one-fifth in 1975. This change does not reflect a reduction in the volume of loblolly pine in the state or even a reduction in the volume of larger trees. A comparison of loblolly volume between 1950 and 1976 shows a slight increase in sawtimber volume and only a minor change in the distribution of this volume in dbh class. The decline in loblolly sawlog production is due instead to a change in softwood markets in recent years from sawlogs to pulpwood and veneer.

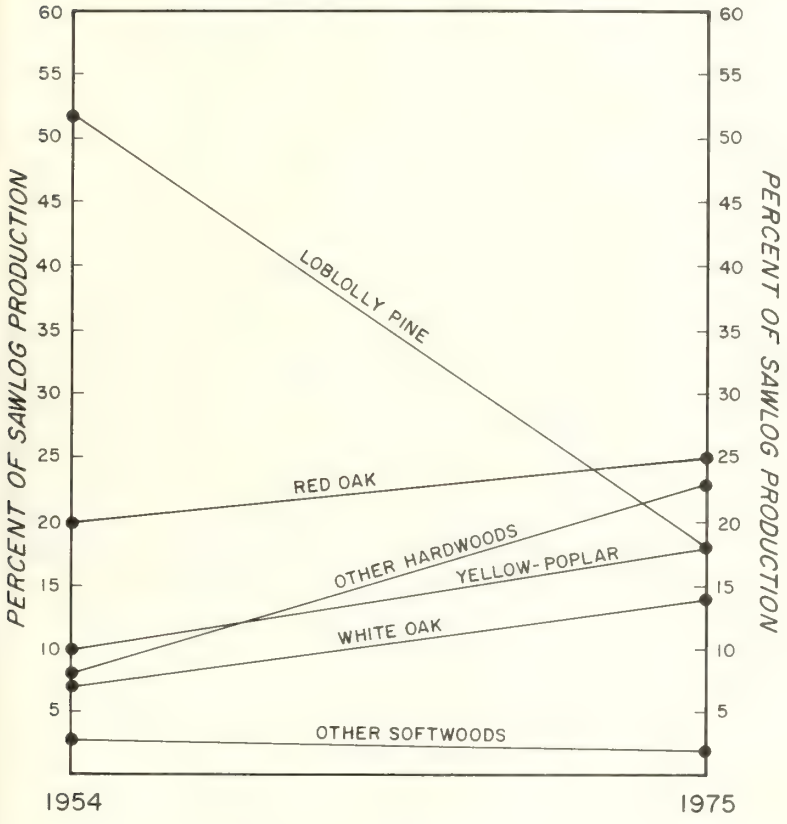
Since total sawlog production has not declined nearly as sharply as loblolly pine sawlog production, the hardwood species have increased proportionately to make up the difference. Oaks have increased in sawlog production from 27 percent in 1954 to 39 percent in 1975. Yellow-poplar production rose from 10 to 18 percent. Other hardwoods, such as gum, maple, ash, cherry, hickory, and beech, have increased dramatically from 8 percent of the sawlog production in 1954 to 23 percent in 1975.

Pulpwood

Pulpwood production has steadily increased in importance since 1952 (Fig. 11). In 1952, pulpwood accounted for 11 percent of the roundwood harvest. By 1963, this figure had increased to 18 percent and in 1975 reached 32 percent.

Total pulpwood production is derived from two sources: roundwood, harvested from the forests and chipped residues, a byproduct of sawmills and other primary wood manufacturing plants. In 1963, roundwood production was 138,000 cords and made up 75 percent of the total pulpwood production. In 1975, roundwood production had increased by 20 percent to 165,200 cords, but made up only 62 percent of the total production. Residues, generally slabs and trimmings from sawmills that are chipped for pulpwood, have increased their share of production from 25 percent in 1963 to 38 percent in 1975. In 1963, only 45,600 cord equivalents of chips were produced from resi-

Figure 12.—Percent of sawlog production in Maryland, by major species group, 1954 and 1975.



dues while 100,941 cord equivalents were produced in 1975—an increase of 121 percent. Total pulpwood production rose by 45 percent over this period, increasing from 183,600 cords in 1963 to 266,100 in 1975. In 1976, the most recent year for which pulpwood production data are available, total production increased by 6 percent to 281,900 cords. Both roundwood and residue production rose.

The softwood-hardwood mix of pulpwood production for 1975 showed that softwoods accounted for 60 percent of the total and hardwoods 40 percent. This has changed little since 1963. In 1975, more than 97 percent of the softwood pulpwood harvest was pine, mostly loblolly pine from the Lower Eastern Shore. Oak and hickory accounted for 43 percent of the 1975 hardwood pulpwood harvest. Figure 13 shows pulpwood production in Maryland, by source, for 1963 through 1976.

In both 1963 and 1975, five counties accounted for more than three-quarters of the roundwood production:

1963

County	*Production in cords*
Allegany	36,600
Garrett	33,800
Wicomico	14,900
Charles	12,700
Prince Georges	10,600
Total	108,600

1975

County	*Production in cords*
Garrett	31,100
Worcester	30,400
Allegany	29,300
Wicomico	22,000
Somerset	11,700
Total	124,500

Garrett and Allegany counties produce most of the hardwood pulpwood. They are heavily forested with hardwood stands, and, with a pulpmill at Luke (Allegany County), there is an available market for the raw material. Wor-

cester, Wicomico, and Somerset Counties, in the heart of the loblolly pine region of Maryland, produce most of the softwood pulpwood.

Since there are only two woodpulp mills in the state (the other is a small plant that makes floor covering and building materials in Finksburg (Carroll County), it is not surprising that 53 percent of the 1975 pulpwood harvest was shipped to out-of-state pulpmills. The difference between hardwood and softwood exports is pronounced and is mainly the result of pulpmill location. In 1975, only a small fraction of the hardwood production left Maryland. Of the softwoods, however, 68 percent of the roundwood production was harvested from the four Lower Eastern Shore counties and most was shipped to Virginia. Thus an increasingly larger portion of trees cut in Maryland is for pulpwood, more than one-half of which is shipped out-of-state for conversion into woodpulp.

Other timber products

Roundwood output of timber products other than sawlogs and pulpwood has been declining at a faster rate than total roundwood output since 1952 (Fig. 11). In 1952, these products, including veneer, piling, fuelwood, cooperage, poles, posts, and mine timbers, amounted to 23.8 million cubic feet or 35 percent of the

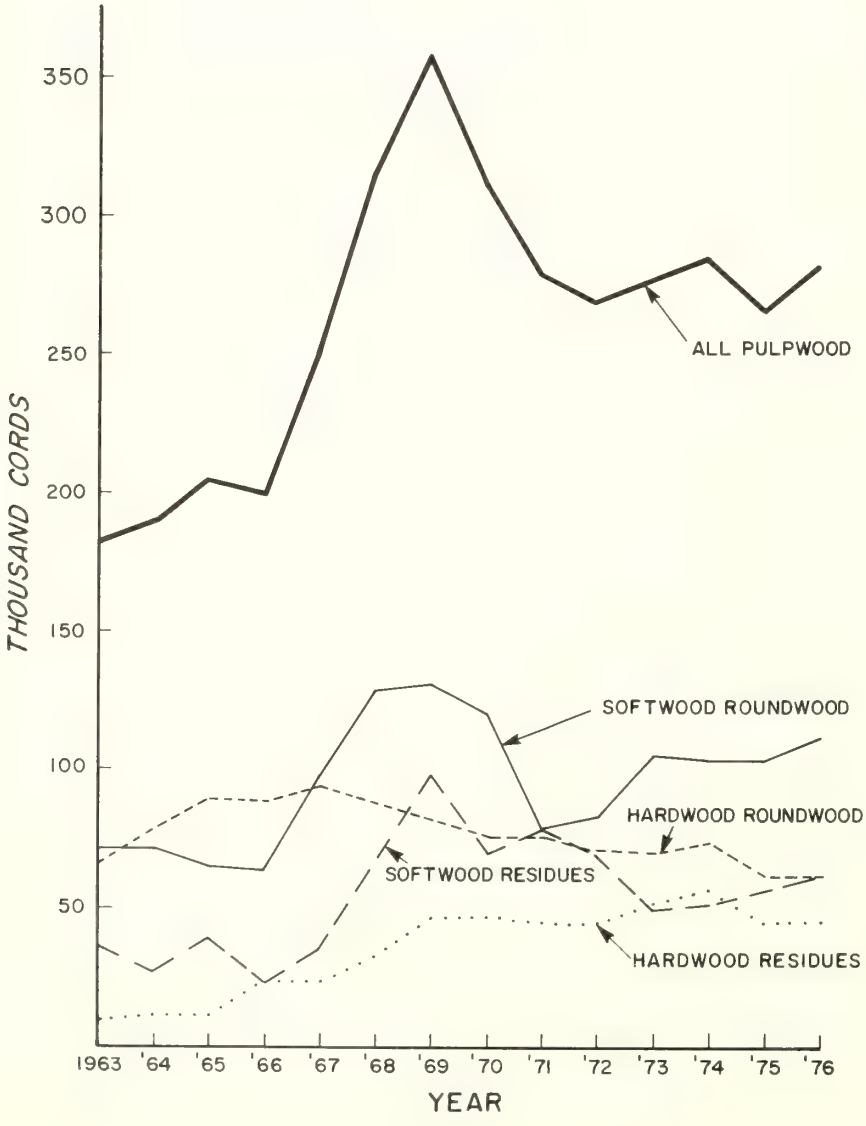
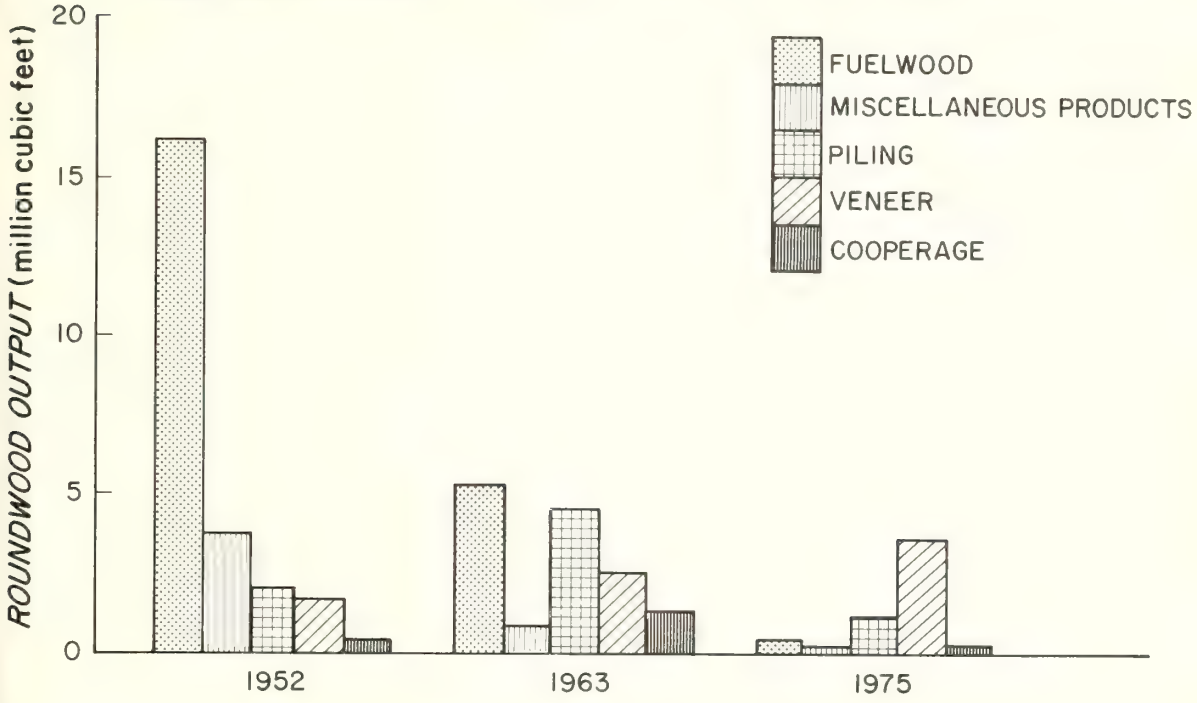


Figure 13.—Pulpwood production in Maryland, by source, 1963-1976.

Figure 14.—Other timber products output from roundwood in Maryland (fuelwood, miscellaneous products, piling, veneer, and cooperage), 1952, 1963, and 1975.



roundwood output. In 1963, only 14.5 million cubic feet (or 23 percent of that year's total) of these products were produced; by 1975, output had dropped to 5.6 million cubic feet or only 13 percent of the total. Figure 14 shows how the output of the more important minor products has changed since 1952.

Besides pulpwood, the veneer industry is the only other timber industry that is expanding production in Maryland. While Figure 14 shows a steady increase in production since 1952, a peak of 23.4 million board feet was reached in 1968 and production dropped back to 21.8 million board feet by 1975. The 1975 output is still a 37-percent increase over the 15.9 million board feet produced in 1963. The most recent data available show that veneer production rose to 24.8 million board feet in 1976.

There are three veneer plants in Maryland. The two located in Cockeysville, Baltimore County, are face-veneer mills that slice hardwood logs for veneer used in furniture and paneling. Though they are relatively small operations, they produce valuable, high-quality material. The third mill is a commercial plywood mill located in Pocomoke City, Somerset County. This mill peels loblolly pine logs and makes the veneer into plywood for construction use. This large mill, built in 1967, is the main reason that softwood veneer log output jumped by nearly 1,150 percent from 1963 to 1975. Two container veneer plants that produced hardwood basket veneer have closed since 1963. These closures are the main reason that hardwood veneer log output dropped by 64 percent between 1963 and 1975.

While piling output amounted to 2.9 million linear feet in 1975, or only 3 percent of the roundwood output of the state, Maryland produces the majority of the pilings in the Northeast. Nearly all of the pilings produced in Maryland in 1975 were softwood, mostly loblolly pine. Because these pilings must be very straight and often quite long, they are more valuable than sawlogs or pulpwood. Piling production fluctuates widely and since many pilings are used to replace damaged or rotten ones, piling production often increases after a particularly harsh winter.

All other products combined amounted to only 2 percent of the 1975 roundwood output. Fuelwood production has dropped drastically since 1952, both from roundwood and from manufacturing byproducts. With fossil fuels becoming scarcer and more expensive, the use of wood as fuel may rise. Cooperage log production, generally from hardwoods, was 1.5 million board feet in 1975, down 79 percent from the 7.2 million board feet produced in 1963. Miscellaneous products such as poles, posts, mine timbers, and ties have decreased since 1952 (Fig. 14), and in 1975 amounted to only 200,000 cubic feet or ½ of 1 percent of the roundwood output.

The place of wood in Maryland's economy

Maryland is a state with a great variety of resources, and this has contributed to the large number of different industries in the state today. Wood-based industries represent a healthy share of the total, accounting for 12 percent of the manufacturing establishments in Maryland in 1972 (U.S. Bureau of Census 1975). This group of industries is diverse and includes such primary industries as sawmills, pulpmills, and veneer mills, as well as secondary industries producing such items as furniture, mill stock, flooring, cabinets, boats, and paper.

In 1972, the payroll for wood-based industries in Maryland amounted to about $128 million, or 5 percent of the statewide industrial payroll. Value added by manufacturing, which indicates the relative economic importance of an industry, is the difference between the cost of goods and services purchased by a manufacturer and the value of the products sold. In 1972, the value added by wood-based industries was about $245 million, again, 5 percent of the state total. The paper and allied products industries accounted for the greatest part —about 65 percent—of the total for all wood-based industries.

While wood-based industries do not constitute a large share of the total manufacturing, they are certainly important in several counties. Garrett, Charles, Calvert, and St. Marys Counties have between 45 and 59 percent of their industry in lumber, wood, and paper and allied products (U.S. Bureau of Census 1975). These counties also have between 51 and 74 percent of their land in commercial forests, and rural populations account for at least 80 percent of the total population. Most of the secondary wood-based industries are located in more heavily populated areas, such as Baltimore County, but they are outnumbered by other industries in these areas.

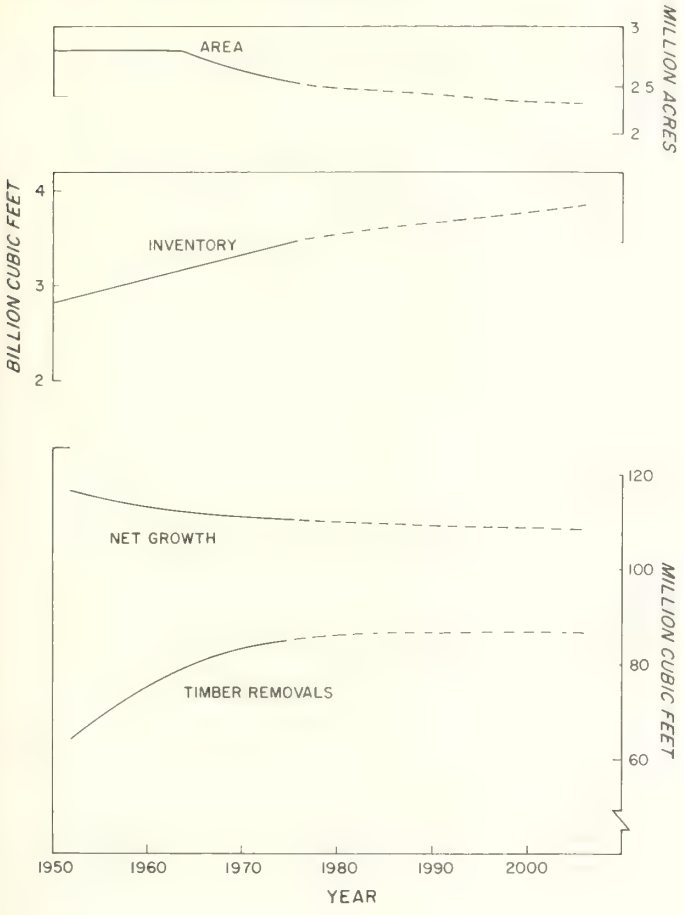
TIMBER SUPPLY OUTLOOK

Long-range projections are hazardous. Long-range projections of timber supply, particularly in today's rapidly changing world, are no exception to this rule. In Maryland, the problem is further compounded by the location of the state. The Boston-Washington megalopolis cuts a wide swath through Maryland's center; to the east lies one of the most productive agricultural regions on the Eastern Seaboard; and to the west lies a region of steep hills and mountains more typical of West Virginia and western Pennsylvania than of the rest of Maryland.

From 1907 to 1950 forest land increased by fewer than 17,000 acres. With increasing farm abandonment, particularly in central and western Maryland, forest land rose from 2,919,800 acres in 1950 to 2,963,000 in 1964. Since 1964, the area of forest land has declined significantly to 2,653,200 in 1976. Most of this decline has resulted from urban and suburban expansion, primarily in the Central and Southern Units. Over the next 30 years, the area of commercial forest land is expected to decline at a constant rate of 0.3 percent per year. Thus commercial forest land will drop from the present 2,522,700 acres to 2,305,000 in the year 2006 (Fig. 15A). Most of this decrease will be in the Central and Southern Units, where urbanization is expected to continue. The Lower Eastern Shore is expected to show a slight decline in commercial forest land as a result of an increasing demand for agricultural land. The forest-land area of the Western Unit, the only unit to show an increase in forest land since 1964, is expected to decline slightly as farm abandonment abates and more forest land is lost due to increases in strip mining and road building.

Statewide, only a very modest increase in timber removals is expected—1.2 million cubic

Figure 15.—Projected changes in area, inventory, net growth, removals through 2006.



Considerable forest-land acreage has been lost in Maryland to highway construction and housing developments since the mid-1960's.

Maryland Forest Service photos

feet (Fig. 15C). This, however, is a net effect. Decreases in removals are expected in the Central and Western Units; in the Southern Unit, no change is expected. However, increases are expected in the Lower Eastern Shore Unit as the demand for loblolly pine becomes greater. As Table 30 shows, all of the increase in removals will come from softwoods; hardwood removals should drop slightly over this 30-year period.

Because total removals are not expected to exceed growth over the projection period (Fig. 15C) and because the excess of growth over removals will more than offset the decreasing area of commercial forest, we anticipate an increase in the total growing-stock inventory (Fig. 15B). The current growing-stock inventory stands at 3.5 billion cubic feet and is expected to rise to 3.8 billion in 2006. Nearly all of this increase will come from hardwood species since this is where the gap between growth and removals will be largest.

Again, however, this overall view masks many important regional changes. In the Central Unit we can expect a slight drop in growth brought on by increasing stand density, which itself will be brought on by declining timber removals. Little change in the inventory is expected in the Southern Unit. In the Lower Eastern Shore Unit, despite an increase in timber removals, we can expect an increase in the inventory as growth, already the highest per acre in the state, is increased further as forest management of the region's pine resource is stepped up. In the Western Unit, the only unit in which removals exceed growth, the growing-stock inventory is expected to drop as this overcutting continues. Although overcutting is expected to continue, it will become less severe as timber demand is shifted out of the region and forest management becomes more intense.

Although we anticipate no significant increase in timber removals over the projection period, we do expect that more of the timber that is removed will be used for products. At the present time, about a third of the total volume of growing stock that is removed in Maryland is not used for timber products. With multi-product logging techniques and whole-tree chippers, it will become more and more practical to convert more of the volume removed into a useable product.

TIMBER MANAGEMENT OPPORTUNITIES

When managing commercial forest land for timber production, the primary objective of the manager usually is to grow as much high-quality timber as possible. It follows that his efforts should be in areas that have good potential for growing crops of trees. Eighty-four percent of the commercial forest land in Maryland has the potential of growing at least 50 cubic feet per acre per year. Nearly 40 percent of the woodland is capable of producing at least 85 cubic feet per acre per year, and it is these 981,700 acres that offer the best opportunities for management. While the differences between units are not large, the units with the highest proportion of good sites are the Central and Western.

There is much work to be done, however, before these stands reach their potential. When we look at actual productivity, we see that only 22 percent of the commercial forest land is producing more than 50 cubic feet per acre per year, and only 5 percent is producing more than 85 cubic feet per acre per year. Opportunities for improvement are greatest in the Central Unit, where 89 percent of the commercial forest land is currently producing less than 50 cubic feet per acre per year. Achieving this improvement will be difficult in this part of Maryland, however, since this is an area with an expanding population, where thousands of forested acres are being converted to housing and other nonforest uses each year. Another obstacle, the private ownership of small, forested tracts, will be discussed later.

There are many ways to improve productivity. One major opportunity in Maryland would be to bring understocked forest land to a fully stocked condition. If we consider all live trees, 85 percent of the commercial forest land in Maryland is fully stocked or better. This seems to leave little room for improvement. However, when we eliminate all the cull trees and consider only growing-stock trees, only 52 percent of the forest land is at least

fully stocked. The Lower Eastern Shore Unit has the best stocking with 75 percent of its stands fully stocked. The Western Unit is poorest with only 18 percent.

Stocking and productivity can be improved by applying sound silvicultural practices. In an effort to identify the stands that could benefit from such practices, our field crews evaluated each forested plot and made recommendations that they felt were necessary to maintain or improve the condition of the stand. The results indicate that 58 percent of the stands could use some type of silvicultural treatment, such as thinning, weeding, pruning, improvement cutting, conversion of stand to another type by thinning or planting or both, or removal of immature stand to be followed by regeneration. Only 13 percent of the stands have mature timber and are ready to be harvested and regenerated. The remaining 29 percent of the stands are in good condition and need no treatment at present. This last category ranges from 12 percent in the Western Unit to 53 percent in the Lower Eastern Shore Unit, reflecting basically the current intensity of timber management.

Recommended treatments are quite variable between stands because of differences in forest type, site and stand conditions, past management practices, owner objectives, and economic feasibility. Because of this, there is no substitute for an on-the-ground inspection and evaluation by a professional forester of each stand to be managed. The Maryland Forest Service will provide such services to interested landowners free of charge, and many consulting and industrial foresters also are available to provide assistance. Even though each prescription by a forester will be tailored to a particular set of conditions and circumstances, some general statements concerning timber management of Maryland's two most important forest types will give the reader a better feeling for how such stands are usually managed when maximum timber yield is the primary goal.

The major hardwood type-group, oak/hickory, is best managed using even-age silvicultural procedures if oaks are to be perpetuated (Watt et al. 1973). This means that trees in a stand should be cut at roughly the same time

This loblolly pine was killed by the southern pine bark beetle. The bark sloughed off with help from a hungry woodpecker.

Maryland Forest Service photo

so that all trees forming the new stand will be nearly the same age. The most common method, clearcutting, allows the oak, hickory, yellow-poplar and other associated species that grow best without shade to establish the new stand. To maintain oak/hickory, however, clearcutting should only be done when there are enough small oak and hickory trees growing in the ground-level stratum of the present stand to regenerate it. Without such advance reproduction, the new stand will contain few oaks and hickories. Light cuttings from the needed intermediate operations will not only remove culls and improve the stocking, productivity, and quality of many oak/hickory stands, but they will also open the canopy enough so that oak/hickory advance reproduction can become established.

The major softwood-type group, loblolly and shortleaf pine, also is best managed for

timber production by even-age operations (Mann 1973). While this is a valuable, productive type on the Lower Eastern Shore, good loblolly pine stands do not result without strict control of hardwoods. Because so many good pine sites reverted to hardwoods after the pine was cut out, Maryland recently passed the Pine Tree Reforestation Act to get more pine lands into pine production. The law states that anyone cutting timber on lands 25 percent stocked with loblolly, shortleaf, or pond pine must either leave seed trees or submit an alternate plan for reforesting the area. While the natural regeneration from seed trees is relatively inexpensive, there is often a better opportunity, especially on good sites, for artificial regeneration, or planting. After a stand has been clearcut and the hardwoods controlled, generally by prescribed burning or mechanical chopping, the area can be hand or machine planted with genetically superior pine seedlings obtained from State and private nurseries. This form of intensive management is profitable and is practiced on many loblolly pine stands in eastern Maryland.

Another way to increase productivity is to reduce mortality by protecting forests from wildfires, insects, and diseases. From 1964 to 1976 there were nearly 8,000 fires that burned some 25,750 acres. While this 13-year total amounts to only 1 percent of the forest land in Maryland, losses from forest fires may be significant to individual land owners. Even though fire may not kill trees directly, it often weakens them and fire scars provide entryways for insects and diseases. Practically all of the fires were man-caused, a fact which points to the need for more education of the dangers of wildfires and more caution in the woods.

Insects that damage or kill trees have been serious threats in the past and may cause problems in the future. In 1971, on the Delmarva Peninsula, an outbreak of the Southern pine bark beetle killed or weakened thousands of pine trees, destroying some 35 million board feet of timber. The activity of this serious pest has subsided since then, but may flare up again when conditions are right. Gypsy moths have been in the state since 1970, but there has been no serious defoliation so far. This defoliator of hardwoods (primarily white oak) is currently moving south from Pennsylvania,

In some intensively managed loblolly pine stands in eastern Maryland, drum choppers are used in cutover areas to prepare them for pine regeneration.

Maryland Forest Service photo

and its progress is being closely monitored in Maryland. Controlling this pest will be a major challenge in the near future. Other diseases and insects—oak wilt, sweetfern rust, forest tent caterpillar—are serious only in scattered, local situations and containing them will keep mortality levels low.

In 1975, growing-stock mortality totaled 16.1 million cubic feet, and sawtimber mortality was 25 million board feet. Much of this was due to nonpreventable causes such as weather and natural suppression. But some of this loss was caused by man's activities—logging and fire—and some by his inactivity—lack of forest management. But there is an opportunity to change this loss into a gain in productivity.

For timber management to be an attractive investment for the forest landowner, there must be markets available for the timber he cuts. There has been and will continue to be a strong demand for high-quality stock of preferred species, because this is a scarce resource. Much of the removals necessary for upgrading the quality and productivity of the timber resource are low-grade or small materials or both. What are the opportunities for using and marketing such removals?

Several products are being made from low-quality timber. Veneer is usually made from high-quality logs, but more and more poor-grade material is being sliced to make beautifully charactered veneer. Other products from low-quality logs are mine timbers, which are in demand in the coal fields of western Maryland as well as neighboring West Virginia and Pennsylvania; pallets, which are in demand in the Baltimore area for shipping and storage of a wide variety of goods; and crossties, which are produced mainly on the Eastern Shore where several treating plants are located.

In the woods, whole-tree utilization and tree-length logging offer good potential for increased use. The former, used in eastern Maryland with both softwoods and hardwoods, entails clearcutting an area and then chipping all material that will not make quality sawlogs. Thus nearly all of the logging residues, such as tops and branches, are used and the wood resource is used more completely. On the Eastern Shore, tree-length logging of pine has increased the amount of wood that is removed and used.

Whole-tree logging is one way to use the timber resource more effectively.

Maryland Forest Service photo

Whole-tree chipping on the logging site has been used to reduce logging residues.

Northeastern Forest Experiment Station

Northeastern Forest Experiment Station

After as much wood as possible is removed during logging, what are the opportunities for using this fiber, much of which is unsuitable for lumber? One major use is pulpwood or chips for wood pulp. Both hardwoods and softwoods can be used successfully. Hardwood chips are gaining in popularity and the possibilities for their use are numerous. Perhaps the product with the greatest potential in Maryland is fuelwood. Many forest industries could use residues to fuel their operations and may be expected to do so in the future. But, with the expanding urban and suburban population of the state, the demand for firewood for household fireplaces and stoves is very strong and is perhaps the best solution to using poorer material and upgrading the timber resource of Maryland.

Despite the many opportunities for improved timber management, there are some serious barriers. One that we touched on is lack of local markets in certain areas for small or low grade material from intermediate or harvest cuttings. Perhaps an even larger obstacle is the ownership situation in the state.

Since 90 percent of the commercial forest land is in private hands, the private landowner holds the timber management key. The reasons these people own woodland are quite varied, but 12 percent of the private woodland acreage is held by owners who have timber production as their primary reason. This figure is only 4 and 5 percent for the Central and Southern Units, and 15 and 31 percent for the Western and Lower Eastern Shore Units. These last two units seem to have the best potential on the basis of reasons for owning forest land.

Another factor is length of ownership—28 percent of the private woodland has been held fewer than 10 years by its owners. With tree crops requiring anywhere from 40 to 100 years to mature, this turnover rate may be a problem. Size of ownership is also an obstacle, the average ownership being only 23.8 acres of woodland. This ranges from 15.9 acres in the Central Unit to 50.2 acres in the Western Unit. For the state, 38 percent of the private woodland is in ownerships of fewer than 50 acres. This ranges from 23 percent in the Lower Eastern Shore Unit to 53 percent in the Central Unit. Generally, ownerships of fewer than 50 acres are difficult to manage with long-term forestry goals because they are too small to yield profitable returns at reasonable intervals.

All of these factors—owner objectives, turnover rate, and size of ownership—must be dealt with if significant gains in timber production are to be realized. Means should be found to interest forest landowners in the continued practice of forest management. An answer to this, where possible, is for owners of adjoining tracts to work together over extended periods of time. While it may be difficult for these owners to agree on managing their land for timber, if they can agree to manage their lands for any of the various forest resources, such as water, wildlife, or recreational use, then they will have made an excellent start. If done properly, timber production can benefit or be compatible with management of these other forest resources. With good incentives, markets, assitance, and determination, the private forest landowners of Maryland can improve the quality and productivity of their woodlands and at the same time reap the many benefits that forest-land ownership can provide.

NONTIMBER FOREST RESOURCES

Although the bulk of this report concentrates on the timber resource of Maryland, there are many other resources that are very much influenced by trees and forest stands. While 40 percent of the land area of the state may be covered with commercial forests, only a small percentage of the 4 million residents of Maryland view this land from a timber or wood-product perspective. Recreational use of the forest rates high with the typical Marylander, who lives in an urban environment. But other resources are plentiful in Maryland's woodland: water, soil, fish, and wildlife. These resources are all interrelated, and, together with the timber resource, form an integral part of the forest ecosystem.

Water

Water, the most vital natural resource, is directly and indirectly affected by the forests of Maryland. Annual precipitation averages 43 inches, ranging from 48 inches on the west side of Backbone Ridge (Garrett County) and

Lower Eastern Shore (Worcester County) to 36 inches in the rain shadow of Allegany County. Most of the rain that falls on forests is readily absorbed by the litter and humus soil layers that act as a sponge. Overland flow or runoff in undisturbed forests is uncommon. Once water enters the soil, tree roots take in much of it. The remainder becomes ground water that eventually finds its way into streams and rivers.

Because of Maryland's unique shape and geographic location, there are four major drainages in the state (Fig. 16). Water from 3 percent of the commercial forest land drains directly into the Atlantic Ocean; 8 percent into the Ohio River; 36 percent into the Potomac River; and 53 percent into Chesapeake Bay. The topography of the area determines the nature of the streams in these drainages. In general, streams in western Maryland are fast-flowing because of pronounced changes in elevation; those in the Piedmont vary from fast-flowing at their headwaters to moderate as they near the estuarian areas of the Chesapeake; and those that traverse the low-lying Coastal Plain are the most sluggish.

Tree growth is an excellent watershed cover. Because the forest soil absorbs so much moisture and the trees and shrubs pull in so much through their roots (indeed, forests may transpire one-half the annual precipitation yearly), there is much less water available for flooding. No land use can prevent floods, but forest cover comes closest to this by tempering their intensity and lessening the danger of severe floods. Forests also help regulate streamflow by releasing water gradually. Forest cover also provides shade which minimizes water loss through surface evaporation. Forests act as storage reservoirs that continue to release water even when natural precipitation fails.

By minimizing flooding and runoff and by binding the soil with extensive root systems, forests control erosion. Erosion leads to stream sedimentation, which is a form of pollution that can kill fish, clog channels, displace water from reservoirs, and increase water treatment costs. The inevitable movement of soil from land to sea is so slow beneath a cover of woody growth that the ongoing forces of soil formation balance, or even exceed, the forces of erosion.

Several cities, including Baltimore, Hagerstown, and Frederick, recognize the need for forests in meeting their municipal water demands. These cities own and manage forested lands as watersheds for the primary purpose of providing a good and steady water supply. While a no-cut, no public use policy on a forested watershed will maintain high water quality and relatively even flows, sound multiple-use management of the watershed can provide many more benefits with little, if any, change in the quantity and quality of the water leaving the area. Baltimore is perhaps most active in this field, owning forest land on three watersheds on which it cuts timber as well as permits a great variety of recreational activities (Hartley 1975). But publicly owned watersheds are few and far between. Thus private woodland owners must be relied upon to manage their forest land intelligently with water quality in mind if Maryland is to continue to meet the needs of its growing population.

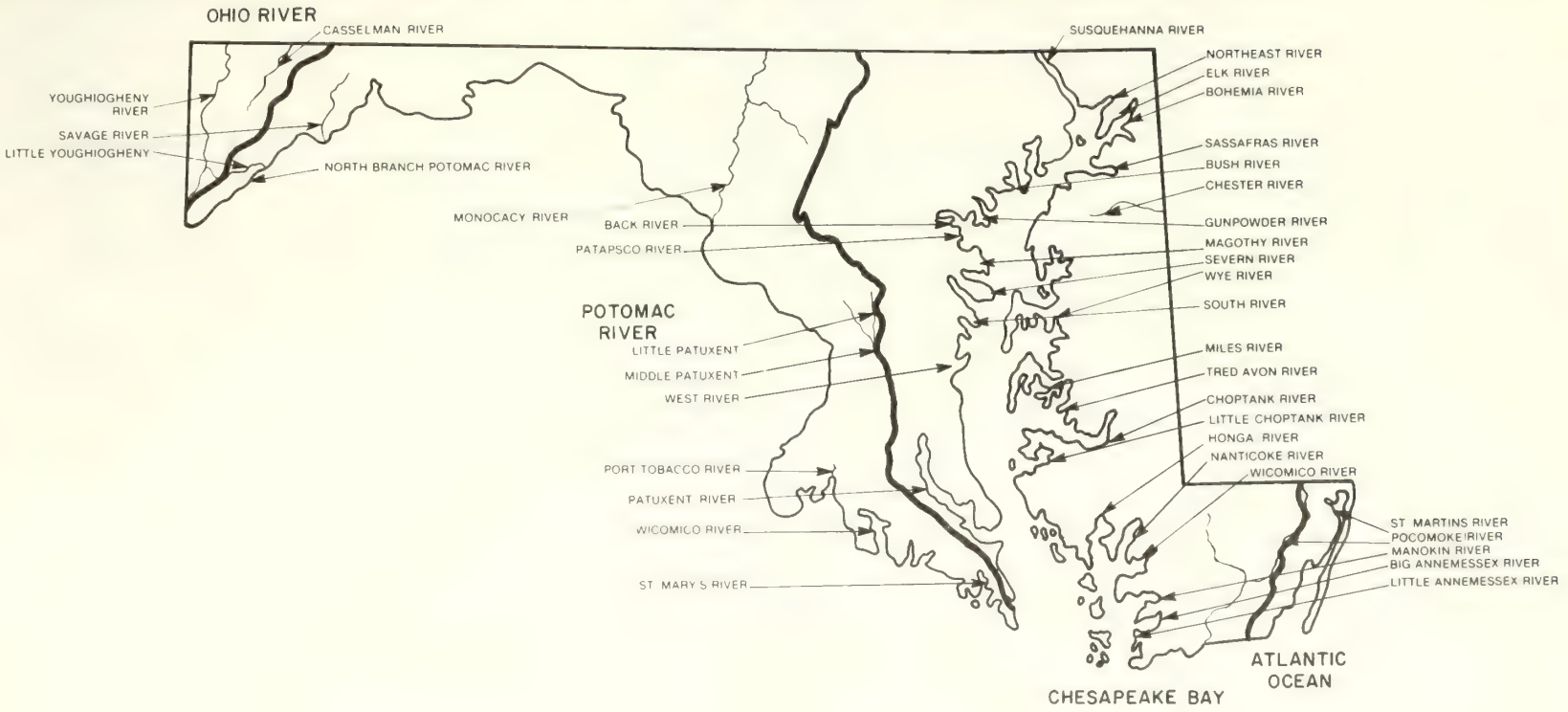
Soil

Soil is perhaps the most overlooked and underrated forest resource. It is generally out of sight, lying beneath leaves, shrubs, rocks, trails, or roads. You can't drink it, play in it (unless you're a kid), grow it, or market it. And yet without soil, there would be no forests.

Soil formation is a very slow process; it can take hundreds of years to produce an inch of mineral soil. The raw material for soil comes from below—parent material or bedrock—and from above—organic matter such as leaves and dead trees or animals, and exposed rocks and outcrops. Weather is the primary force on these materials as wind and water work to wear down exposed material and as water freezes in crevices breaking apart larger rocks. Tree roots also help by growing into cracks and enlarging them as they grow. Moisture and temperature also work closely with fungi to convert organic debris on the forest floor to humus, which is eventually incorporated into the topsoil.

Soils provide trees with four essentials: anchorage, water, mineral nutrients, and aeration for roots. Additionally, soil provides a medium for mycorrhizal-forming fungi, which increases the absorptive surface area of plants, which improves plant growth and vitality. How

Figure 16.—The four major drainages of Maryland.



well water, nutrients, and air move through the soil to provide a proper rooting medium depends on the physical and chemical properties of the soil. The closer these properties are to meeting the optimum requirement of the trees growing in a soil, the greater the soil's potential productivity for those trees.

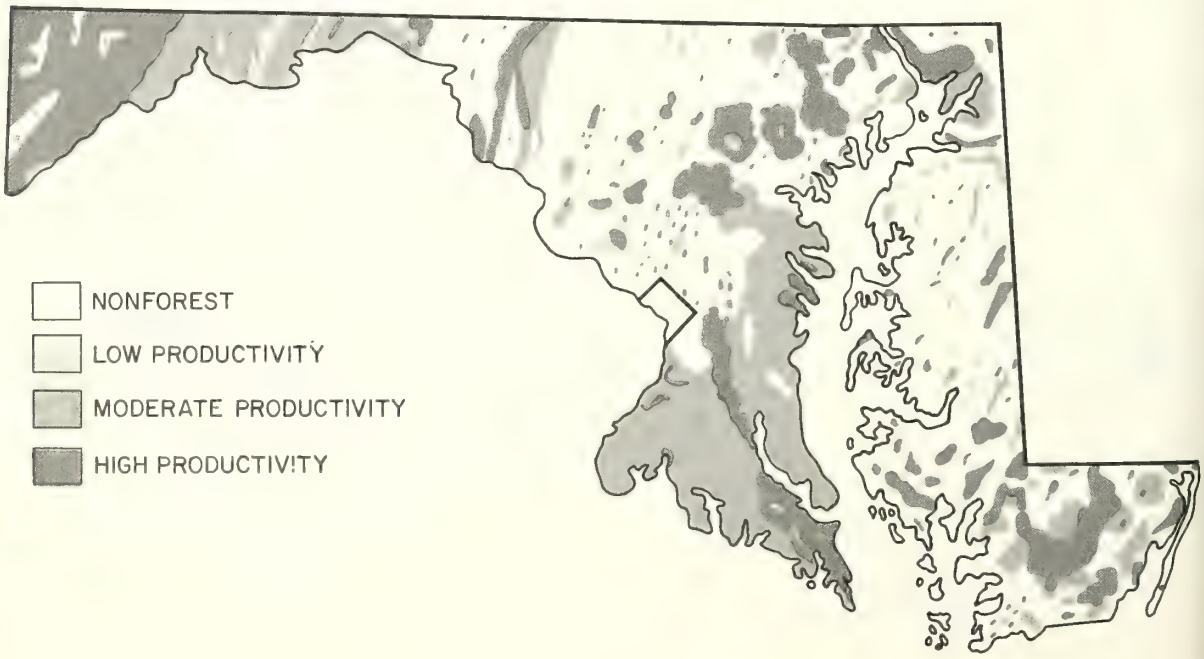
Because of the variety of raw materials and climates in Maryland, there are some 750 different types of soils in the state (Maryland Department of State Planning 1973), each with its own particular set of properties. These properties naturally influence tree occurrence and growth. The U.S. Soil Conservation Service has developed woodland productivity ratings that indicate the potential of each soil for producing tree crops. With the help of the Maryland Forest Service and the Maryland Department of State Planning, we produced a map of Maryland showing forested areas of high, medium, and low woodland productivity, based on soil properties and characteristics (Fig. 17).

Of the forested land in Maryland, only 3 percent has low potential for producing crops of timber on the basis of soil characteristics. Nearly all of this land is in Allegany County in the "rain shadow" area east of the Allegheny Front. This area receives the least precipitation in the state, and this is reflected by the thin and relatively unfertile shale soils. Forty-four percent of the forested land has moderate potential. These areas are scattered throughout the state, but concentrated in Allegany, Frederick, Charles, and Calvert Counties.

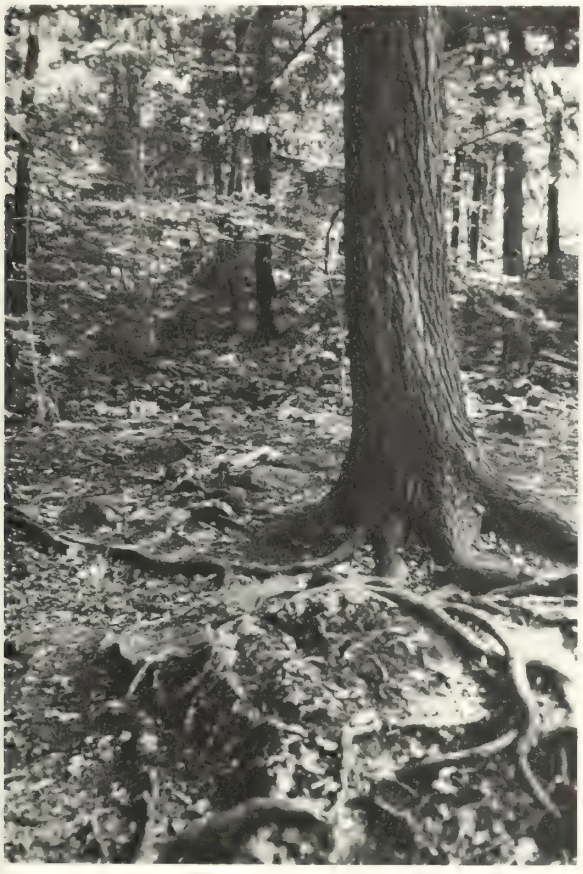
The majority of the woodland—53 percent —occurs on soils with high potential productivity. These areas are also scattered throughout the state, but are most common in Garrett, St. Marys, and Dorchester Counties and in the central Lower Eastern Shore area around Whiteburg, Worcester County. Many of these soils are in areas that receive up to 48 inches of precipitation yearly. On many of these sites, the potential is realized in excellent, well-managed stands of timber. In other areas, the forest stands do not indicate the high productivity potential because of past land history and current nonmanagement conditions.

The productivity of the forests depends on fertile soils; anything that lessens fertility will be detrimental. Soil erosion, particularly of the fertile top soil, is a natural process that is

Figure 17.—Potential for growing trees on the basis of soil properties and characteristics.



The concentrated use of nonreinforced hiking trails can lead to soil compaction and erosion, and exposure of and injury to tree roots.



Mike Walsh photo

often increased several fold by man, and can be very harmful to the soil and other forest resources.

Because of differences in soil, climate, topography, and land use, the amount of erosion varies from one area of the state to another. For the counties in the Coastal Plain east of the Chesapeake Bay (Fig. 1), where the terrain is relatively flat, erosion is least destructive. North-Central Maryland is an area with only moderate erosion on forest land. Soil erosion is certainly a problem in this region, however, since it is the least heavily forested area of Maryland. This area also supports substantial farmland where soil is often left bare between plantings and is vulnerable to the forces of wind and water.

The situation is worst in the Western Unit and in southern Maryland (Anne Arundel, Prince Georges, Calvert, Charles, and St. Marys Counties). In the west the steep slopes often have thin soils. Serious erosion may result if these soils are disturbed, for example, in the building of roads for logging. This potential for erosion, which exists throughout Maryland but is greatest in the west, can be minimized by careful planning, construction, and maintenance of haul and skidroads. The situation in the south is one of relatively flat terrain but with short, steep slopes and wet flood plains. The soils contain little sand, much clay, and are very erodible. Maintenance of forest cover is critical to the soil resource in certain localities, and logging should be done with special care.

Fish and wildlife

There are approximately 1,428 miles of fishable, nontidal streams and rivers in Maryland, nearly all of which flow through forest land at one point or another (Maryland Department of State Planning 1972).

Forests affect fish habitats in several beneficial ways. Shade lowers stream temperatures, improving living conditions for coldwater fish and spawning conditions for warmwater fish. Forests along streams and around reservoirs

After logging is completed, nonpermanent roads should be revegetated quickly to minimize soil erosion. This is a logging road 1 year after harvesting.

protect the waters and the fish in them by yielding surface and ground water at relatively stable rates, even during storms. Water from forested watersheds is generally sediment free. Sediment harms fish by killing insects and other preferred foods, by suffocating fish eggs, and by decreasing living space by filling pools. Also, trees growing along the edge of streams and reservoirs stabilize the banks. This improves fish habitat by reducing erosion.

Good forest management is necessary to maintain maximum benefits for Maryland's fisheries. Clearcuts in the vicinity of streams should not be large, and buffer strips should be left surrounding the streams themselves. Logging roads of all types should be designed to minimize erosion, and stream crossings should be made only at properly constructed bridges, culverts, or fords. In western Maryland, areas disturbed by strip mining should be reforested to improve the fish habitat. In general, forestry practices that protect the water resource also will protect the fish resource.

Warmwater and coldwater fisheries are most affected by Maryland's forests. A third, tidal fisheries, is affected only indirectly through the discharge of freshwater into tidal areas and through the use of freshwater streams for spawning of anadromous and estaurine species such as striped bass, shad, herring, white perch, and yellow perch.

Warmwater fish, those that generally prefer water 75°F or warmer, include such native species as bass, bluegill, catfish, carp, crappie, and pickerel and such introduced species as northern pike and walleye. Warmwater fishing is more popular in Maryland than coldwater because the modern angler prefers pond fishing over stream fishing (personal communication, Dave Woronecki, Coldwater Fisheries Program Leader, Maryland Fisheries Administration). Also, access is easier to ponds and reservoirs, especially for fishermen with boats. Roughly 60 percent of the Maryland Fisheries Administration's inland fish budget goes to warmwater programs. An active stocking program adds nearly ½ million largemouth bass, bluegills, and channel catfish annually to streams, ponds and reservoirs in Maryland. A large warmwater fish hatchery is under construction at the Cedarville Natural Resources Management Area on the Prince Georges-Charles County line.

Coldwater fishery means trout, the prestige fish in the Northeast. Brook trout is the only native trout, but catches of it are insignificant when compared to the harvest of the introduced and heavily stocked rainbow trout. On average 225,000 catchable-size trout are stocked in coldwater streams and impoundments and 75 to 90 percent of these are rainbows. Some brook trout also are stocked. These fish are stocked primarily for recreational purposes as 50 to 75 percent of fish stocked each year are caught.

Because of its location, Maryland is marginal between being a coldwater or a warmwater state. This means most of the coldwater habitat is either in the Western Unit where the climate is cool or in areas such as Washington, and Baltimore Counties where limestone springs yield cool, hard, nutritious water that is excellent for trout reproduction and survival. In fact, the greatest population of native trout in Maryland is in heavily populated Baltimore County. In these warmer areas, forest shading of streams is very important to keep the streams as cool as possible.

From 1964 through 1976, an average of nearly 125,000 fishing licenses were sold in Maryland each year. The number of trout fishermen is between 30,000 and 50,000. The Fisheries Administration estimates current production of nontidal waters at 10.7 million pounds a year. Total expenditures by fishermen in Maryland for 1975 were estimated at over $190 million. These figures show the importance of the fish resource. The maintenance and expansion of the resource to meet future demand will be due in no small part to the forests of Maryland and the roles that they play in the feeding and harboring of the state's fisheries.

Wildlife, other than fish, are grouped into two broad classes: nongame species and game species. Many species in each class depend heavily on forests for food and shelter. Nongame species, while clearly more abundant and common than game species, have not received as much attention from public agencies whose funding comes primarily from the hunting sector. Recently, more attention has been given these species, which include songbirds, hawks,

To varying degrees, Maryland's forests contribute to the well-being of many wild animals such as turkeys, mallards, great horned owls, and white-tailed deer.

Denise Hendershot photo; the rest are Leonard Lee Rue III

This hunter displays a pair of ruffed grouse, one of the most challenging upland game birds in Maryland's forests.

Leonard Lee Rue III photo

woodpeckers, shrews, mice, salamanders, turtles, and snakes. The Maryland Wildlife Administration now has a nongame and endangered species program that is responsible for 37 species of amphibians, 46 species of reptiles, 280 species of birds, and 51 species of nongame wildlife. In Maryland there are 35 species recognized as endangered. Many of these species, such as the black bear, mountain lion, and bobcat, are very dependent on forests for their survival. The loss of forest land to nonforest uses has reduced the suitable habitat for these animals. The state's endangered species program has been inventorying these species to identify the extent of the problem. A future step is to enter into land-protection agreements with private forest-land owners, who control more than 90 percent of the forest land in Maryland. In this way, protection, and maybe expansion, of critical habitats can be assured.

Besides playing essential roles in their respective forest ecosystems, nongame animals, as well as game species, provide significant recreational opportunities. Because of its diversity of habitats and its location in the midst of the Atlantic Flyway, Maryland is a paradise for bird watchers. Wildlife photography also is popular. There are several wildlife refuges in the state where nonconsumptive use of this forest resource is in demand year round.

There are many popular game animals in Maryland. In order of popularity and demand, based primarily on hunter days spent afield, squirrels rank number one, and are generally followed by deer, rabbits, geese, pheasants, quail, mourning doves, ducks, grouse, and turkey. There are nearly 50 state-owned hunting areas with associated forest land scattered across Maryland. There are also cooperative wildlife management areas in Baltimore and Carroll Counties where state and private landowners work together to provide good hunting. And there are four managed hunting areas where proximity to urban areas and heavy demand have required the state to restrict hunting. The greatest opportunity, however, lies with private forest-land owners. According to our ownership survey, approximately 18,100 of them, owning 749,400 acres of commercial forest land, would permit public hunting on their land.

The importance and popularity of hunting in Maryland is undeniable. Total expenditures for hunting in 1975 were estimated to exceed $100 million. The sale of hunting licenses provided money for 58 percent of the Maryland Wildlife Administration's budget. From 1964 to 1976, an average of nearly 185,000 licenses were sold annually. These hunters in the mid-1970's harvested an estimated 10,000 deer and turkey and more than 2.1 million small game animals annually.

Game and nongame species are associated with forests to varying degrees. Geese, for example, rely on the forest primarily for the clean water it produces. Squirrels, at the other extreme, depend exclusively on the forest for food and shelter. For those animals that spend most of their time on land, certain forest types are more favorable than others, mainly be-

cause of available food and cover. Even more important in determining desirable habitat are the stand size and transition zones between different-size stands. Some species, like wild turkey, prefer extensive pole- and sawtimber-size stands. Others, like rabbits, prefer scattered patches of scrubby seedling and sapling stands.

The more diverse the vegetation is in composition, size, and distribution, the more species of wildlife the area will support. Thus, one way that a forest can be managed for both wildlife and timber is to keep cut areas relatively small, numerous, and well distributed over the entire area. This results in the diversity needed for many animals. Specific forestry practices also can be applied for single-species management.

The Maryland Wildlife Administration actively manages the forest lands for which it is responsible. Each area has its own set of wildlife management practices tailored to fit the existing and desired timber wildlife resources. Some of these practices are: rotation mowing of permanent forest openings; daylighting (opening up) woods roads to more sunlight to favor intolerant plant growth; releasing and pruning fruit trees; clearcutting, selection cutting, and thinning of timber for increased mast production, browse, and cover; constructing brush piles; planting shrubs; and releasing desirable food and cover vegetation by girdling and cutting the least desirable trees.

Despite such activity, the wildlife resources of Maryland face serious problems. One major problem is loss of habitat, especially forested areas. Since 1964, Maryland has lost nearly ½ million acres in sawtimber and poletimber stands. More than 70 percent of this loss has occurred in the Central Unit. Once an animal's habitat is destroyed it must move elsewhere or adapt. Some animals have nowhere to move and others cannot adapt further to man's encroachment. This is the story of the threatened and endangered species of Maryland, and the fate, perhaps, of many more. Without wise land use planning, this problem is likely to persist.

Another overriding concern is the public's lack of understanding of wildlife management. For example, attempts at instituting antlerless deer seasons or liberalizing geese limits meet with stiff opposition. As the population expands and grows more urban in its orientation, public attitudes may shift farther away from acceptance of sound management policies and practices. The percentage of hunters in the population has decreased as the number of licenses sold has not kept pace with the rapidly expanding population. Already, 13 percent of the private forest-land owners post their land—some 366,700 acres—just to control hunting. Hunting is a vital tool in modern game management and must be continued to maintain the health and vitality of this forest resource.

In an effort to cope with this problem, the Maryland Wildlife Administration has created a wildlife information and education project. Its activities include information dissemination through printed media and correspondence, public contact and input into programs having public contact, and use of radio, television, and film media to educate the public. The State hopes that such activities will foster concern and increase the awareness and understanding of its citizens toward wildlife.

Outdoor recreation

The forests of Maryland, with their abundant natural resources, offer residents and nonresidents alike many varied outdoor recreation experiences. Beside such generally recognized activities as fishing, hunting, picnicking,

Each spring, white-water streams flowing free through forested land provide recreationists with many thrills and pleasures.

Mike Walsh photo

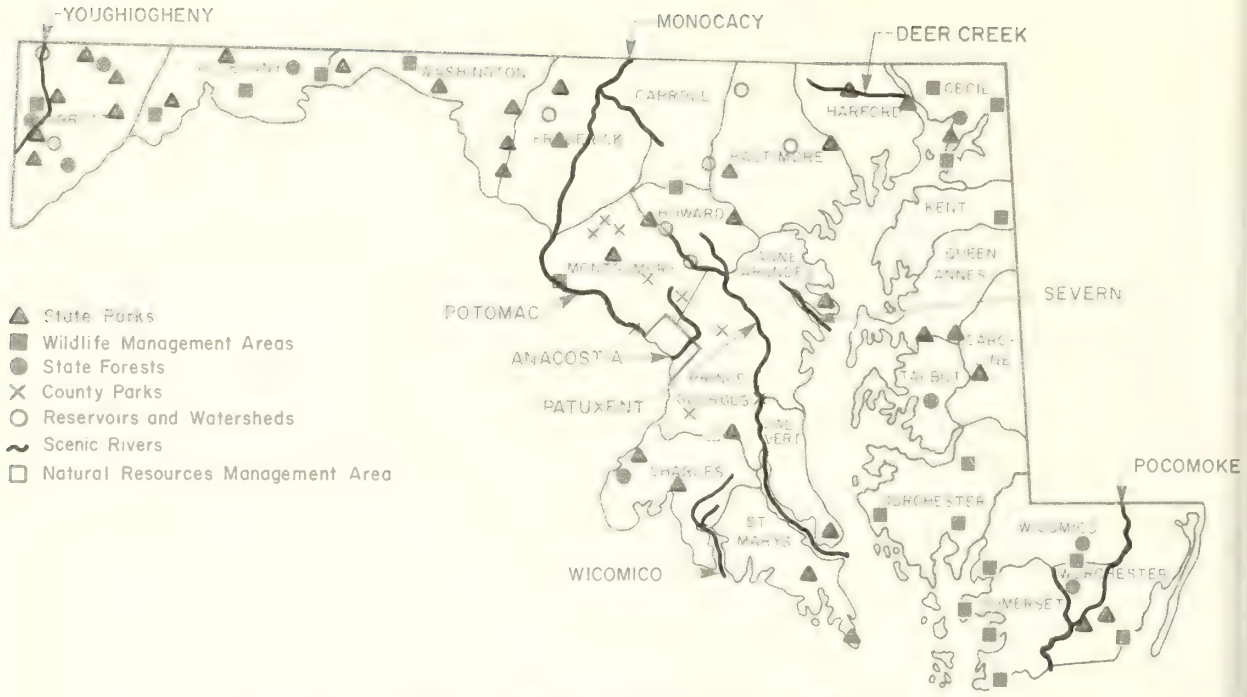


Figure 18.—Major public recreation areas with associated forest land.

sightseeing, camping, and hiking, the quiet and beauty of the woods bestow a certain peace and tranquility on the weary visitor. The forest environments provide unique opportunities to get in touch with nature and to refresh and restore the soul as well as the body. As the population increases and the forest-land base dwindles, forest recreation will continue to be one of the most valuable and popular uses of Maryland's forests.

The variety in climate, topography, forest type, and population distribution within Maryland means the recreational activities will differ from one area to another. The Western Unit, with its mountainous terrain and extensive forested area, offers the most wilderness-like experience available in Maryland. Four of the nine State forests and eight of the 35 State parks with forest land are located in this region (Fig. 18). Deep Creek Lake offers all the pleasures of a clear mountain lake, and the Youghiogheny River, a Maryland Scenic and Wild River, adds another dimension to the water-oriented recreation sites of the area. Besides sightseeing, hunting, fishing, hiking and picnicking, some activities that are common only in this part of Maryland are primitive camping, backpacking, snowmobiling, skiing and sledding, and white-water canoeing. Forest recreational use of this region is intense since highway travel time from the urban Baltimore-Washington area generally is 3 hours or less.

The forest land in the Central Unit is relatively scattered, accessible, and close to the homes of well over 4 million people. This large and diverse area is characterized by rolling hills, dissected by an intensive network of stream valleys interspersed through farm, urban, and suburban development. The woodland around these streams is the main forest recreational focus of the region. Many municipal watersheds and reservoirs are available to people seeking forest recreation experiences. However, too much recreational use may conflict with management for high-quality water. Wise management is needed to balance these uses of the forest land. This unit has a variety of State and County parks in wooded settings.

The Southern Unit has several opportunities for public forest recreation. There are five State parks, one State forest, two State Scenic Rivers (The Patuxent and Wicomico), and the

Cedarville Natural Resources Management Area. This last area is unique in the state, and may be a trend-setter in public land management. A comprehensive management plan has been drawn up for the area, which was formerly a State park and a State forest. This plan calls for complete and integrated multiple-use management of the forest for water, wildlife, recreation, and timber. The area serves as a showcase where people can see how compatible these diverse uses of the forest land can be under the watchful care of well-trained land managers.

The Lower Eastern Shore Unit offers a different recreational environment. The weather is generally warm and humid; the land is flat to gently rolling and marked by vast wetlands; and the forests are dominated by loblolly pine. Opportunities for observing, photographing, and hunting migrating waterfowl are ideal here, with many unique habitats available to them for nesting and wintering. Year-round camping is possible here as it is across Chesapeake Bay in the Southern Unit. The Pocomoke River, a Maryland Scenic River, provides the forest recreationist with enjoyable canoeing and different vantages for viewing the areas pine forests and fascinating cypress swamps.

The Maryland Department of Natural Resources, through the forests, wildlife management areas, and parks that it is charged with managing and administering, controls about three-quarters of the publicly owned forest land available for outdoor recreation. Each area has forest resources that offer a different set of recreational opportunities; taken together, they meet the needs of nearly everyone.

But there are problems on these areas, and they usually result from overuse. The parks alone provide recreation for 8 million people, almost twice the number of Maryland residents, and these numbers are increasing daily. Crowded conditions not only lessen the quality of the experience but also damage the resources. Streams and reservoirs become polluted; soil becomes compacted and infertile; trees lose vitality, are weakened, and eventually die; and fish and wildlife habitats and food chains are disrupted. People are already being turned away from some areas in an effort to minimize these problems. Where can these people go for recreation in a forested setting?

Again, the answer, in part, is the privately owned forest land of Maryland. This major resource of nearly 2.3 million acres is not nearly being used to its recreational capacity. Not all of this land is suited or even available for public recreational use. But the results of our woodland ownership survey show that 26 percent of the private owners—24,600—would permit public use of their 973,700 acres of forest land. This is more than four times the total amount of public forest land available for recreation. The activity permitted most often on private land was hunting, followed by hiking, picnicking, fishing, camping, and snowmobiling. With demand for forest recreation increasing, these private woodlands are certain to play a more dominant role in meeting the recreational needs of Maryland and her neighbors.

LITERATURE CITED

Besley, F. S.
1916. **The forests of Maryland.** Md. State Board For. 152 p.

Bones, James T. and John E. Brodie.
1977. **The timber industries of Maryland.** USDA For. Serv. Resour. Bull. NE-52. 20 p.

Ferguson, Roland H.
1967. **The timber resources of Maryland.** USDA For. Serv. Resour. Bull. NE-7. 93 p.

Hartley, Brent A.
1975. **Baltimore municipal watershed.** *In* Municipal watershed management symposium proceedings. USDA For. Serv. Gen. Tech. Rep. NE-13. p. 84-97.

Liscinsky, Steve.
1978. **Poletimber for wood and wildlife: ten years of study.** Pa. Game News 49(2):41-43.

Mann, William F., Jr.
1973. **Southern types; Loblolly-shortleaf pine.** *In* Silvicultural systems for the major forest types of the United States. U.S. Dep. Agric., Agric. Handb. No. 445. p. 95-98.

Maryland Department of State Planning.
1972. **Maryland outdoor recreation and open space comprehensive plan, phase II.** Md. Dep. State Plann. Publ. No. 175. 120 p.

Maryland Department of State Planning.
1973. **Natural soil groups technical report.** Md. Dep. State Plann. Publ. No. 199. 153 p.

U.S. Bureau of Census.
1975. **Census of manufacturers 1972, area series, Maryland, MC72(3)-21.** U.S. Dep. Commer. Bur. Census, Washington, D.C. 23 p.

U.S. Forest Service.
1955. **The timber resource in Maryland.** USDA For. Serv., Northeast. For. Exp. Stn. 41 p.

Watt, Richard F., Kenneth A. Brinkman, and B. A. Roach.
1973. **North Central types: Oak-hickory.** *In* Silvicultural systems for the major forest types of the United States. U.S. Dep. Agric., Agric. Handb. No. 445. p. 66-69.

APPENDIX

Definition of terms

Acceptable trees. Growing-stock trees of commercial species that meet specified standards of size and quality, but do not qualify as desirable trees.

Accretion. The estimated growth for the period between inventories of growing-stock trees that were measured during the previous inventory. It includes the growth on trees that were cut during the period, plus those trees that died and were used.

Annual mortality trend-level. The estimated mortality of growing stock or sawtimber for a specific year (1975 for Maryland) that is based on average rates of diameter growth and mortality for the period. This estimate is consistent with the average annual change during the period between surveys and with the current inventory.

Annual net growth trend-level. The estimated growth of growing stock or sawtimber for a specific year (1975 for Maryland) that is based on average rates of diameter growth and mortality for the period. This estimate is consistent with the average annual change during the period between surveys and with the current inventory.

Annual removals trend-level. The estimated removals of growing stock or sawtimber for a specific year (1975 for Maryland) that is obtained from a trend line for the period. This line is established by fitting a curve to actual removals data for several years during the period. The actual removals for the year given may vary from the trend estimate due to fluctuations in market conditions and other factors.

Area-condition class. A classification of commercial forest land based on stocking of acceptable and desirable trees and other conditions affecting current and prospective timber growth.

Average annual ingrowth of growing stock. The net cubic-foot volume of trees now classed as growing stock that were less than 5.0-inches dbh on the previous survey, divided by the length of the period between surveys.

Average annual ingrowth of sawtimber. The net board-foot volume of trees now classed as sawtimber that were not tallied as such on the previous survey, divided by the length of the period between surveys.

Average annual net growth. The change, resulting from natural causes, in growing-stock or sawtimber volume of sound wood in growing-stock or sawtimber trees during the period between surveys, divided by the length of the period. Components of average annual net growth include the increment in net volume of trees present at the beginning of the period and surviving to its end (accretion), plus average annual ingrowth, minus average annual mortality, minus the net volume of trees that became rough or rotten during the period (cull increment).

Average annual removals. The net growing-stock or sawtimber volume of growing-stock or sawtimber trees harvested or killed in logging, cultural operations such as timber stand improvement, land clearing, or changes in land use during the period between surveys, divided by the length of the period.

Basal area. The area in square feet of the cross section at breast height of a single tree, or of all trees in a stand, usually expressed as square feet per acre.

Board foot. A unit of lumber measurement 1 foot long, 1 foot wide, and 1 inch thick, or its equivalent.

Coarse residues. Manufacturing residues suitable for chipping, such as slabs, edgings, and veneer cores.

Commercial forest land. Forest land producing or capable of producing crops of industrial wood (more than 20 cubic feet per acre per year) and not withdwrawn from timber utilization.

Commercial species. Tree species presently or prospectively suitable for industrial wood products. Excludes species of typically small size, poor form, or inferior quality, such as hawthorn and sumac.

Cord equivalent. A unit of measure that is applied to forms of wood other than roundwood, such as chips, slabs, edgings, and other manufacturing residues. In terms of solid wood, it is equivalent to a standard pulpwood cord of 85 cubic feet.

County and municipal lands. Lands owned by counties and local public agencies or municipalities or leased to them for 50 years or more.

Cull increment. The net volume of growing-stock trees on the previous inventory that became rough or rotten trees in the current inventory.

Desirable trees. Growing-stock trees of commercial species: (a) having no serious quality defects that limit present or prospective use for timber products; (b) of relatively high vigor, and (c) containing no pathogens that may result in death or serious deterioration before rotation age.

Diameter at breast height (dbh). The diameter outside bark of a standing tree measured at 4½ feet above the ground.

Farmer-owned lands. Lands owned by farm operators, whether part of the farmstead or not. Excludes land leased by farm operators from nonfarm owners.

Federal lands. Lands (other than National Forests) administered by Federal agencies.

Fine residues. Manufacturing residues not suitable for chipping, such as sawdust and shavings.

Forest industry lands. Lands owned by companies or individuals operating wood-using plants.

Forest land. Land stocked with at least 7.5 square feet of basal area per acre of any size forest trees or that formerly had such tree cover and is not currently developed for nonforest use. The minimum area for classification of forest land is 1 acre.

Forest trees. Woody plants that have well-developed stems and are usually more than 12 feet in height at maturity.

Forest type. A classification of forest land based on the species forming a plurality of live-tree stocking. The many forest types in Maryland were combined into the following major forest type groups:

(a) *white and red pine*—forests in which eastern white pine, red pine, or hemlock, singly or in combination, comprise a plurality of the stocking; in Maryland, common associates include oak, maple, and yellow-poplar.

(b) *spruce/fir*—forests in which spruce or fir, singly or in combination comprise a plurality of the stocking; in Maryland, this group is composed mainly of white and Norway spruce plantations.

(c) *loblolly and shortleaf pine*—forests in which loblolly, shortleaf, or other southern yellow pines (except longleaf or slash pine), singly or in combination, comprise a plurality of the stocking; in Maryland, major species include loblolly, Virginia, and pitch pines and eastern redcedar. Hardwood associates include oaks, red maple, and blackgum.

(d) *oak/pine*—forests in which hardwoods (usually white, northern red, black, scarlet, or chestnut oaks) comprise a plurality of stocking but where pines or eastern redcedar comprise 25 to 49 percent of the stocking; in Maryland, common associates besides those listed above include Virginia and loblolly pine, southern red oak, hickory, and blackgum.

(e) *oak/hickory*—forests in which upland oaks or hickory, singly or in combination, comprise a plurality of the stocking and in which pines and eastern redcedar comprise less than 25 percent of the stocking; in Maryland, common associates include hard pines, maple, beech, ash, yellow-poplar, sweetgum, blackgum, and elm.

(f) *oak/gum/cypress*—bottomland forests in which wet-site oaks, sweetgum, or baldcypress, singly or in combination, comprise a plurality of the stocking and in which pines comprise less than 25 percent of the stocking; in Maryland, common associates include American elm, red maple, blackgum, and green ash.

(g) *elm/ash/red maple*—forests in which American elm, black ash, red maple, willow, or sycamore, whether singly or in combination, comprise a plurality of the stocking; in Maryland, common associates include bottomland oaks, river birch, blackgum, and silver maple.

(h) *maple/beech/birch*—forests in which sugar maple, beech, yellow birch, black cherry, or black walnut, either singly or in combination, comprise a plurality of the stocking; in Maryland, common associates include northern red oak, red maple, white ash, basswood, and hemlock.

Growing-stock trees. Live trees of commercial species classified as sawtimber, poletimber, saplings, and seedlings; that is, all live trees of commercial species except rough and rotten trees.

Growing-stock volume. Net volume, in cubic feet, of growing-stock trees 5.0 inches dbh and larger, from a 1-foot stump to a minimum 4.0-inch top diameter outside bark of the central

stem, or to the point where the central stem breaks into limbs. Net volume equals gross volume less deduction for cull.

Hardwoods. Dicotyledonous trees, usually broad-leaved and deciduous.

Industrial wood. All roundwood products except fuelwood.

Ingrowth. The estimated volume of growing-stock trees that became 5.0 inches dbh or larger during the period between inventories.

International ¼-inch rule. A log rule, or formula, for estimating the board-foot volume of logs. The mathematical formula is: $[(D^2 \times 0.22) - 0.71\ D] \times 0.904762$ for 4-foot sections, where D = diameter inside bark at the small end of the section. This rule is used as the U.S. Forest Service Standard Log Rule in the Eastern United States.

Land area. (a) Bureau of Census: The area of dry land and land temporarily or partly covered by water, such as marshes, swamps, and river flood plains; streams, sloughs, estuaries, and canals less than ⅛ statute mile wide; and lakes, reservoirs, and ponds less than 40 acres in area; (b) Resources Evaluation: same as (a), except that the minimum width of streams, etc., is 120 feet, and the minimum size of lakes, etc., is 1 acre.

Logging residues. The unused portions of growing-stock trees harvested or killed in the process of logging.

Manufacturing plant residues. Wood materials that are generated when converting round timber (roundwood) into wood products. This includes slabs, edgings, trimmings, miscuts, sawdust, shavings, veneer cores and clippings, and pulp screening. If these residues are used, they are referred to as plant byproducts.

Miscellaneous private lands. Privately owned lands other than forest-industry and farmer-owned lands.

National Forest lands. Federal lands legally designated as National Forests or purchase units and other lands administered as part of the National Forest System by the Forest Service.

Noncommercial forest land. Productive-reserved, urban, and unproductive forest land.

Noncommercial species. Tree species of typically small size, poor form, or inferior quality that normally do not develop into trees suitable for industrial wood products.

Nonforest land. Land that has never supported forests, or land formerly forested but now in nonforest use such as cropland, pasture, residential areas, and highways.

Nonstocked areas. Commercial forest land that has fewer than 12.5 square feet of basal area per acre of growing-stock trees.

Other removals. The growing-stock volume of trees that were removed from the inventory by cultural operations (weeding, thinning, etc.), land clearing, or reclassification of some commercial forest land as noncommercial forest land and were not used for products.

Plant byproducts. Wood products, such as pulp chips, recycled from manufacturing plant residues.

Poletimber stands. Stands stocked with at least 12.5 square feet of basal area per acre of growing stock with half or more or such stocking in poletimber or sawtimber trees or both, and in which the stocking of poletimber exceeds that of sawtimber.

Poletimber trees. Live trees of commercial species meeting regional specifications of soundness and form and at least 5.0 inches in dbh, but smaller than sawtimber trees.

Productive-reserved forest land. Forest land sufficiently productive to qualify as commercial forest land, but withdrawn from timber utilization through statute, administrative designation, or exclusive use for Christmas tree production.

Primary wood manufacturing plant. A plant that converts round timber into wood products such as woodpulp, lumber, veneer, cooperage, and dimension.

Pulpwood. Roundwood converted into 4- or 5-foot lengths or chips, and chipped plant byproducts that are prepared for manufacture into woodpulp.

Rotten trees. Live trees of commercial species that do not contain at least one 12-foot sawlog or two noncontiguous sawlogs, each 8 feet or longer, now or prospectively, and do not meet regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of the cull volume in a tree is rotten.

Rough trees. (a) The same as rotten trees, except that rough trees do not meet regional specifications for freedom from defect primarily because of roughness or poor form, and (b) all live trees of noncommercial species.

Roundwood products. Logs, bolts, or other round timber generated by harvesting trees for industrial or consumer uses.

Saplings. Live trees 1.0 through 4.9 inches dbh.

Sapling-seedling stands. Stands stocked with at least 12.5 square feet of basal area per acre of growing stock with half or more of such stocking in saplings or seedlings or both.

Sawlog. A log meeting regional standards of diameter, length, and defect, including a minimum 8-foot length and a minimum diameter inside bark of 6 inches for softwoods and 8 inches for hardwoods. (See specifications under Log Grade Classification.)

Sawlog portion. That part of the bole of a sawtimber tree between the stump and the sawlog top; that is, the merchantable height.

Sawlog top. The point on the bole of a sawtimber tree above which a sawlog cannot be produced. The minimum sawlog top is 7.0 inches diameter outside bark (dob) for softwoods and 9.0 inches dob for hardwoods.

Sawtimber stands. Stands stocked with at least 12.5 square feet of basal area per acre of growing stock with half or more of such stocking in poletimber or sawtimber trees or both, and in which the stocking of sawtimber is at least equal to that of poletimber.

Sawtimber trees. Live trees of commercial species at least 9.0 inches dbh for softwoods of 11.0 inches for hardwoods containing at least one 12-foot sawlog or two noncontiguous 8-foot sawlogs, and meeting regional specifications for freedom from defect.

Sawtimber volume. Net volume in board feet, International ¼-inch rule, of sawlogs in sawtimber trees. Net volume equals gross volume less deductions for rot, sweep, and other defects that affect use for lumber.

Seedlings. Live trees less than 1.0 inch dbh that are expected to survive.

Site class. A classification of forest land in terms of inherent capacity to grow crops of industrial wood. Classifications are based on the mean annual growth of growing stock attainable in fully stocked natural stands at culmination of mean annual growth.

Softwoods. Coniferous trees, usually evergreen and having needles or scalelike leaves.

Stand. A group of forest trees growing on forest land.

Stand-size class. A classification of forest land based on the size class (that is, seedlings, saplings, poletimber, or sawtimber) of growing-stock trees in the area.

Standard cord. A unit of measure for stacked bolts of wood, encompassing 128 cubic feet of wood, bark, and air space. Fuelwood cord estimates can be derived from cubic-foot estimates of growing stock by applying an average factor of 80 cubic feet of solid wood per cord. For pulpwood, a conversion of 85 cubic feet of solid wood per cord is used because of the more uniform character of pulpwood.

State lands. Lands owned by the State or leased to the State for 50 years or more.

Stocking. The degree of occupancy of land by trees, measured in basal area of tress in a stand compared to the basal area of trees required to fully use the growth potential of the land (or the stocking standard). In the Eastern States this standard, is 75 square feet of basal area per acre. The level of stocking, from a management perspective, is seen as a range of values rather than single points. An overstocked stand is stocked with at least 130 percent of the basal-area standard. A fully stocked stand lies within the range of 100 and 130 percent stocked. A medium-stocked stand is between 60 and 100 percent stocked. A poorly stocked stand is below 60 percent stocked.

Three categories of stocking are used:

All live trees—these are used to classify forest land and forest types.

Growing-stock trees—these are used to classify stand-size classes and area-condition classes.

Desirable trees—these are used to classify area-condition classes.

Timber products. Manufacturing plant byproducts and roundwood (round timber) products harvested from growing-stock trees on commercial forest land; from other sources, such as cull trees, salvable dead trees, limbs,

tops and saplings; and from trees on noncommercial forest and nonforest lands.

Timber removals. The growing-stock or sawtimber volumes of trees removed from the inventory for roundwood products, plus logging residues and other removals, for a specific year. (1975 for Maryland.)

Unproductive forest land. Forest land that is incapable of producing 20 cubic feet per acre per year of industrial wood under natural conditions, because of adverse site conditions.

Unused manufacturing residues. Plant residues that are dumped or destroyed and not recovered for plant byproducts.

Upper-stem portion. That part of the main stem or fork of a sawtimber tree above the sawlog top to a diameter of 4.0 inches outside bark or to the point where the main stem or fork breaks into limbs.

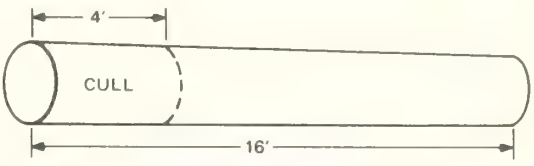
Urban forest land. Noncommercial forest land within urban areas that is completely surrounded by urban development (not parks), whether commercial, industrial, or residential.

Log-grade classification

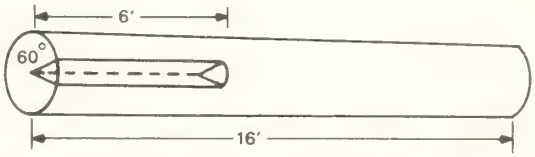
Log grades are a classification of logs based on external characteristics as indicators of quality or value. The log-grade standards and grading systems for softwoods and hardwoods used in this forest survey are shown in the following specifications:

Methods of determining scaling deduction.

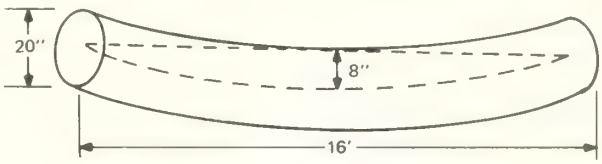
(Examples based on a 16-foot log with 20-inch scaling diameter)



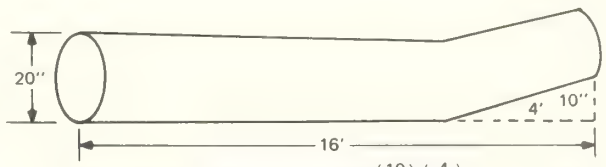
Defect section (rule 1): Percent deduction = $\frac{4}{16}$ = 25%



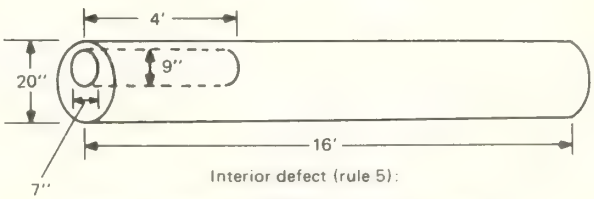
Defect section (rule 2): Percent deduction = $\left(\frac{6}{16}\right)\left(\frac{60}{360}\right)$ = 6-1/4%



Sweep (rule 3): Percent deduction = $\frac{8-2}{20}$ = 30%



Crook (rule 4): Percent deduction = $\left(\frac{10}{20}\right)\left(\frac{4}{16}\right)$ = 12-1/2%



Interior defect (rule 5):

Percent deduction = $\frac{(8)(10)}{(20-1)^2} \times \frac{4}{16}$ = 5-5/9%

In practice each elipse axis can be divided by (20−1)

Thus $\frac{8}{19}$ = .4, $\frac{10}{19}$ .5, and (.4) (.5) $\left(\frac{4}{16}\right)$ = 5%

From: Grosenbaugh, L.R. 1952. Shortcuts for cruisers and scalers. U.S. Dep, Agric. For. Serv. South. For Exp. Stn. Occas. Pap. 126.

SOUTHERN PINE SAWLOGS

Grade 1. Logs with 3 or 4 clear faces.[1] Code 1.

Grade 2. Logs with 1 or 2 clear faces. Code 2.

Grade 3. Logs with no clear faces. Code 3.

After the tentative log grade is established from above, the log will be degraded one grade for each of the following, except that no log can be degraded below grade 3.

1. *Sweep.* Degrade any tentative 1 or 2 log one grade if sweep amounts to 3 or more inches and equals or exceeds one third (1/3) the diameter inside bark at small end. This is the final grade if there is no evidence of heart rot.

2. *Heart rot.* Degrade any tentative 1 or 2 log one grade if conk, massed hyphae, or other evidence of advanced heart rot is found anywhere in it.

[1] A face is one-fourth of the circumference in width extending full length of the log. Clear faces are those free of: knots measuring more than one-half inch in diameter, overgrown knots of any size, holes more than one-fourth inch in diameter. The faces may be rotated if necessary to obtain the maximum number of clear ones.

From: Schroeder, J. G., R. A. Campbell, and R. C. Rodenbach. 1968. Southern pine sawlogs for yard and structural lumber. USDA For. Serv. Res. Pap. SE-39.

EASTERN WHITE PINE SAWLOG GRADE SPECIFICATIONS

GRADING FACTOR	LOG GRADE 1	LOG GRADE 2	LOG GRADE 3	LOG GRADE 4
(1) MINIMUM SCALING DIAMETER (inches)	14[1]	6	6	6
(2) MINIMUM LOG LENGTH (feet)	10[2]	8	8	8
(3) MAXIMUM WEEVIL INJURY (number)	None	None	2 injuries[3]	No limit
(4) MINIMUM FACE REQUIREMENTS	Two full length or four 50% length good faces.[4] (In addition, log knots on balance of faces shall not exceed size limitations of grade 2 logs.)	No GOOD FACES REQUIRED. Maximum diameter of log knots on three best faces:		Includes all logs not qualifying for No. 3 or better and judged to have at least one-third of their gross volume in sound wood suitable for manufacture into standard lumber.
		SOUND RED KNOTS not to exceed 1/6 scaling diameter and 3 inch maximum. DEAD OR BLACK KNOTS including overgrown knots not to exceed 1/12 scaling diameter and 1½ inch maximum.	SOUND RED KNOTS not to exceed 1/3 scaling diameter and 5 inch maximum. DEAD OR BLACK KNOTS including overgrown knots not to exceed 1/6 scaling diameter and 2½ inch maximum.	
(5) MAXIMUM SWEEP OR CROOK ALLOWANCE (percent)	20	30	40	66⅔
(6) MAXIMUM TOTAL SCALING DEDUCTION (percent)	50	50	50	66⅔

After the tentative log grade is established from face examination, the log will be reduced in grade whenever the following defects are evident:

(7) CONKS, PUNK KNOTS, AND PINE BORER DAMAGE ON BARK SURFACE[5]

Degrade one grade if present on one face.
Degrade two grades if present on two faces.
Degrade three grades if present on three or more faces.

(8) LOG END DEFECTS: RED ROT, RING SHAKE, HEAVY STAIN AND PINE BORER DAMAGE OUTSIDE HEART CENTER OF LOG[5]

Consider log as having a total of 8 quarters (4 on each end) and degrade as indicated below:
Degrade one grade if present in 2 quarters of log ends.
Degrade two grades if present in 3 or 4 quarters of log ends.
Degrade three grades if present in 5 or more quarters of log ends.

[1] 12 and 13 inch logs with four full length good faces are acceptable
[2] 8 foot logs with four full length good faces are acceptable.
[3] 8 foot No. 3 logs limited to one weevil injury
[4] Minimum 50% length good face must be at least 6 feet.
[5] Factors 7 and 8 are not cumulative (total degrade based on more serious of the two). No log to be degraded below grade 4 if net scale is at least one-third gross log scale.

From: Ostrander, M. D., and R. L. Brisbin, 1971. Sawlog grades for eastern white pine. USDA For. Serv. Res. Pap. NE-205.

SPRUCE, FIR, HEMLOCK, TAMARACK, AND CEDAR LOG GRADE

(Minimum merchantability specifications)

Log grade	Minimum size		Defect allowance		Other requirements
	Diameter[1]	Length[2]	Sweep or crook	Total deduction	
	Inches	Feet	Percent	Percent	
1	10-12	8-16 in 2-foot multiples	25	50	Sound knots not over 2 inches in diameter permitted. Shake permitted up to 20 percent of gross scale if not combined with other serious defects.
	13+	8-16 in 2-foot multiples	25	50	Sound knots not over 3 inches in diameter permitted. Shake permitted up to 20 percent of gross scale if not combined with other serious defects.

[1]At small end of log.
[2]Without trim.

From: U.S. Forest Service Northeastern Timber Salvage Administration Report. 1943. Boston, Mass.

STANDARD GRADES FOR HARDWOOD FACTORY LUMBER LOGS

Grading Factors		Log grades							
		F1			F2				F3
Position in tree		Butts only	Butts & uppers		Butts & Uppers				Butts & uppers
Scaling diameter, inches		13-15[a]	16-19	20+	11+[b]	12+			8+
Length without trim, feet		10+			10+	8-9	10-11	12+	8+
Required clear cuttings[c] of each of 3 best faces[d]	Min. length, feet	7	5	3	3	3	3	3	2
	Max. number	2	2	2	2	2	2	3	No limit
	Min. proportion of log length required in clear cutting	5/6	5/6	5/6	2/3	3/4	2/3	2/3	1/2
Maximum sweep & crook allowance	For logs with less than 1/4 of end in sound defects	15%			30%				50%
	For logs with more than 1/4 of end in sound defects	10%			20%				35%
Maximum scaling	deduction	40%[e]			50%[f]				50%

End defects although not visible in standing trees, are important in grading cut logs. Instructions for dealing with this factor are contained in Forest Prod. Lab. Rpt. D 1737.

[a]Ash and basswood butts can be 12 inches if they otherwise meet requirements for small #1's.
[b]Ten-inch logs of all species can be #2 if they otherwise meet requirements for small #1's.
[c]A clear cutting is the portion of a face, extending the width of the face, that is free of defects.
[d]A face is 1/4 of the surface of the log as divided lengthwise.
[e]Otherwise #1 logs with 41-60% deductions can be #2.
[f]Otherwise #2 logs with 51-60% deductions can be #3.

From: Vaughan, C. L., A. C. Wollin, K. A. McDonald, and E. H. Bulgrin. 1966. Hardwood log grades for standard lumber. USDA For. Serv. Res. Pap. FPL-63.

STANDARD SPECIFICATIONS FOR HARDWOOD CONSTRUCTION LOGS.[a]

Position in tree		Butt & upper
Min. diameter, small end		8 inches +
Min. length, without trim		8 feet
Clear cuttings		No requirements.
Sweep allowance, absolute		1/4 diameter small end for each 8 feet of length.
Sound surface defects	Single knots	Any number, if no one knot has an average diameter above the callus in excess of 1/3 of log diameter at point of occurrence.
	Whorled knots	Any number if sum of knot diameters above the callus does not exceed 1/3 of log diameter at point of occurrence.
	Holes	Any number provided none has a diameter over 1/3 of log diameter at point of occurrence, and none extends over 3 inches into included timber.[b]
Unsound surface defects		Same requirements as for sound defects if they extend into included timber.[b] No limit if they do not.
End defects	Sound	No requirements.
	Unsound	None allowed; log must be sound internally, but will admit 1 shake not to exceed 1/4 the scaling diameter and a longitudinal split not extending over 5 inches into the contained timber.

[a]These specifications are minimum for the class. If, from a group of logs, factory logs are selected first, thus leaving only non-factory logs from which to select construction logs, then the quality range of the construction logs so selected is limited, and the class may be considered a grade. If selection for construction logs is given first priority, then it may be necessary to subdivide the class into grades.

[b]Included timber is always square, and dimension is judged from small end.

From: Rast, E. D., D. L. Sonderman, and G. L. Gammon. 1973. A guide to hardwood log grading (Revised). USDA For. Serv. Gen. Tech. Rep. NE-1.

Forest survey methods

The Resources Evaluation unit of the Northeastern Forest Experiment Station used the sampling with partial replacement (SPR) design in the inventory of the timber resources of Maryland. This design and procedure was described by C. A. Bickford, C. E. Mayer, and K. D. Ware in 1963: An efficient sampling design for forest inventory—The Northeastern Forest Resurvey, J. For. 61:826-833; and by J. E. Barnard in 1978: *Example of a specific regional inventory: The United States Northeastern double sampling with partial replacement design, In* the Proceedings of the joint meeting of the groups on forest resource inventory and forest management planning and managerial economics of the International Union of Forestry Research Organizations held in Bucharest, Romania, June 18-24, 1978.

This design estimates forest area and timber volume by combining a new independent photo and ground-plot inventory with a regression updating of previous inventories based on a subsample of remeasured plots. Thus the SPR design, by combining two independent estimates of the inventory, yields a statistically more accurate estimate of the timber resource than other methods for the same cost. Such comparisons were made by J. E. Barnard in 1974: *Sampling with partial replacement contrasted with complete remeasurement inventory designs: An empirical examination; In* the Proceedings of the symposium on monitoring forest environment through successive sampling held at the State Univ. N.Y. College of Environmental Sciences and Forestry, Syracuse.

The source of the new independent estimates of volume and forest area was a new aerial-photo stratification with a subsample of ground measurements. This photo sample in Maryland consisted of 18,793 points on the latest available aerial photography (1970-72). A subset of 939 of these photo plots (including 573 on commercial forest land, 363 on nonforest land, and 3 on unproductive forest land) was located on the ground. Land use was verified and tree-measurement data were recorded on the forested plots. These plots consisted of a cluster of 10 prism points systematically arranged to cover approximately 1 acre. At each point trees were selected for tally by using a prism with a basal-area factor of 37.5.

The other set of independent estimates, based on the updating of the 1964 survey, required the remeasurement of 183 $\frac{1}{5}$-acre plots, originally established during the first survey, and 257 10-point plots (similar to the new 10-point plots), originally established during the second survey.

When the two independent estimates of area and volume are combined, the results are totals by geographic unit, the sum of which results in totals for the state.

Many users of Resources Evaluation data, however, need county information. To provide such information, within the framework of the survey design, tables for counties have been developed, based on a survey-unit partitioning technique.

First, the geographic unit means and variances for the various photo-plot strata were applied to the photo-plot data for each county within the unit. This yielded an estimate of total volume or total commercial forest-land area for each county. Second, the data from all the new-ground plots in each unit were used to partition the county totals into the various components. For example, if a table of cubic-foot volume by softwoods and hardwoods is to be made for a county, the estimate of total cubic-foot volume for that county is partitioned into softwood and hardwood totals according to the proportion of softwoods and hardwoods for the new-ground plots within the unit.

The units used for computing county data are the same as those described in Figure 2 with one exception. The Central Unit was divided into three subunits, which, in turn, acted as units for the particular counties within each subunit. Subunit A included Baltimore, Carroll, Cecil, Frederick, Harford, Howard, Montgomery, and Washington Counties; Subunit B included Anne Arundel, Kent, Prince Georges, and Queen Annes Counties; and Subunit C consisted of Caroline and Talbot Counties. We felt that this subdivision grouped similar counties best for computing county data.

Field-tally data consisting of plot and individual-tree information were processed and compiled into tables using FINSYS—Forest Inventory System—on modern, large-capacity, high-speed computers.

FINSYS is a data-processing system consisting primarily of a series of computer programs developed by the Northeastern Forest Experiment Station to process and compile a large volume of forest-inventory data. The system consists of an editing subsystem that edits field-tally data for errors; a table-compiling subsystem that compiles tables from edited field data; and an output subsystem that expands the plot data to geographic unit or statewide estimates and prints the final tables.

FINSYS was described in a series of research papers by R. W. Wilson and R. C. Peters in 1967: The Northeastern Forest Inventory Data Processing System. USDA For. Serv. Res. Pap. NE-61 and NE-70 to 80.

FINSYS has several features that make it unique. One of these is its flexibility. The system is not restricted to the Northeastern forest survey but can be used for any large-scale forest inventory. Also, the system does not produce a standard set of tables. The user specifies the tables that he desires. Thus, at any stage in the data processing phase, or at a later date, a specific table can be developed with minimum effort.

Another feature of FINSYS is its ability not only to calculate inventory estimates but also to calculate the variance and sampling error for each estimate. This feature provides the user a measure of the reliability of each statistic, and the ability to determine the reliability of a new estimate based on any data combination.

Comparisons between inventories

Data comparisons are made when information on a given resource is available for several points in time. Four inventories of the forest resource in Maryland have been made since 1914. The analysis in this report concentrates on the last three inventories that were conducted by the USDA Forest Service between 1950 and 1976. In these resource inventories, forest sampling procedures were used to estimate area and timber volume.

When making comparisons using information based on sampling two or more different populations at two or more different points in time, one must be aware of several sources of variation in the data. First, the sample estimates are subject to the natural variation within the population. This variation is measurable and is expressed as the sampling error of a particular estimate (see Reliability of the Estimates in the appendix). Changes in the intensity of sampling or in the sampling design enable the inventory planner to minimize the sampling errors of the various inventory estimates. A second source of variation is the differences in procedures (known as "technique differences") used to collect the data for the different surveys. This type of variation can be very important in the comparison of several inventories but is difficult to measure accurately.

The three forest resource inventories of Maryland that have been conducted by the Northeastern Forest Experiment Station, in cooperation with the Maryland Forest Service, have several kinds of technique differences. First, the technical definitions of terminology have undergone changes and modifications. Most of the major changes of this type were made in the late 1950's and early 1960's, but some changes have occurred more recently. A second kind of technique difference results from changes in field plot design and individual-tree measurement procedures. Good training and quality-control procedures help to minimize the effect of these differences. Finally, data compilation and processing procedures can introduce technique differences in the form of computational changes.

The forest resource analyst needs to identify and, where possible, quantify all the above forms of variation to isolate these differences between inventories from the differences due to real changes in the resource population. This process is called a consistency check. For volume evaluation, the TRAS (Timber Resource Analysis System) model serves as a guide in this process. Information obtained from the model is modified and supplemented with other available resource information, research studies, and knowledgeable technical opinion from a variety of reliable sources. The result of this process is a realistic evaluation of resource inventory trends.

The Maryland inventory data presented several analytical problems. The sampling designs, intensity of application, and field measurement and compilation techniques varied with each inventory. Because of these variations between surveys, a consistency check was made.

This began by using TRAS to help reduce the large amount of data to manageable units. Taking the numbers of softwood and hardwood trees by diameter class for a previous survey and then applying our current standards to this data yields estimates of softwood and hardwood volume. This, in effect, puts the data from the previous survey on a comparable basis with the latest survey. Then, using this data for two points in time, with the additional inputs of annual growth, mortality, and removals for the period between inventories, TRAS incrementally moves the softwood and hardwood inventories through the period between surveys. Thus estimates of volume can be made for any or all years between the surveys. This information helps to identify inconsistencies in estimates of volume, growth, mortality, or removals that require further study and evaluation.

In Maryland, TRAS was first run from 1964 to 1976. Doing this gave some figures for 1964 softwood volume that were unacceptably low. After an exhaustive analysis of the 1964 and 1976 surveys, some problems with the softwood data from the 1964 survey were identified. The manner in which the photo- and ground-plot samples were taken in 1964 led to an undersampling of the softwood forest types. The result was a very conservative estimate of the volume of softwoods in 1964.

Having identified the possible cause of the problem, TRAS was run from 1950 to 1976. This produced softwood and hardwood volumes for 1950 and 1964 that were more indicative of the trend in the resource. Because this quarter-century trend seemed more reasonable and was based on more resource information, 1950 was used as the starting point for species consistency. Thus, in certain instances, the 1950/1976 comparisons have been emphasized in this report.

The TRAS estimates for 1950 softwood and hardwood volume required refinement for more detailed analysis, so these two broad groups were divided into nine species groups using the reported data for 1950 and 1964 as a base. The softwood and hardwood data for 1950 from TRAS was so close to the reported data that the TRAS volume was simply apportioned to the species based on their 1950 proportions. For 1964, the figures were different enough from TRAS that another technique was used to develop species volume. This involved using change rates developed from the fixed-radius plots to discount the 1976 volumes back to 1964 by species. These proportions were then adjusted to the 1964 TRAS totals for softwoods and hardwoods.

The trends indicated by these TRAS-adjusted volumes for 1950 and 1964 were then compared with those that the reported data indicated. In all but two cases—loblolly pine and red maple—the differences in figures and trends were insignificant, so the TRAS-adjusted figures were accepted. After a detailed analysis involving study of industry trends, the stand tables generated for the last two inventories, and the silvical characteristics of loblolly pine and red maple, it was determined that the most realistic trends for these species came by making slight adjustments in the reported figures for 1950 and 1964. (For a discussion of these trends see Timber Volume.)

Thus, the species consistency effort incorporated information from the TRAS model as well as more species-specific data from a variety of sources. The resulting figures are the best estimates for growing-stock volume for these nine species groups for three points in time. They should be useful to readers interested in analyzing trends between inventories.

Reliability of the estimates

The forest-area and timber-volume data presented in this report were based on a carefully designed sample of forest conditions throughout the state. However, since neither every acre nor every tree in the state was measured, the data presented in this report are estimates. A measure of the reliability of these estimates is given by a sampling error. An associated sampling error was calculated for each estimate in this report. Many of these appear in the data tables.

Here is an example of how to use sampling errors. The total growing-stock volume estimate of Maryland, 3,492.1 million cubic feet, is our best estimate. It has an associated sampling error of 2.3 percent, or 80.3 million cubic feet. This means that if there are no errors in procedure, the odds are 2 to 1 that if we repeated the survey in the same way, the resulting estimate of growing-stock volume, in millions of cubic feet, would be between 3,411.8 and 3,572.4 or 3,492.1 $\pm$80.3. Similarly, the odds are 19 to 1 that it would be within $\pm$160.6 and 300 to 1 that it would be within $\pm$240.9 million cubic feet.

Because of the nature of sampling, estimates for the state are most reliable (that is, have the smallest sampling errors), followed by unit estimates, and then county estimates. For example, our estimate of commercial forest land for the state has an associated error of 1.7 percent; the error for the Central Unit estimate is 3.4 percent; and the error for the Talbot County estimate is 23 percent.

While county estimates are often desired, they are the least reliable estimates in this report. They are intended for use in compiling forest resource estimates for groups of counties. Because the sampling procedure was intended primarily to furnish inventory data for the survey unit as a whole, individual county estimates have limited and variable accuracy. As county totals are broken down by various subdivisions, the magnitude of the error increases and is greatest for the smallest items. Sampling errors in state and unit tables also behave this way, but the situation is not as serious since the errors for the table totals are smaller to start with.

This computed sampling error is not a complete measure of reliability. There are other sources of error that this term does not include. There could be imperfections in volume tables and equations and errors in field measurement. Procedural errors were kept to a minimum by careful training of all personnel, frequent inspection of field work, and application of the most reliable survey methods.

Commercial Tree Species of Maryland

Scientific Name[1]	*Common Name*	*Occurrence*[2]
	Softwoods	
Chamaecyparis thyoides	Atlantic white-cedar	r
Juniperus virginiana	eastern redcedar	r
Picea abies	Norway spruce[3]	r
Pinus echinata	shortleaf pine	vr
P. pungens	Table-mountain pine	vr
P. resinosa	red pine[3]	r
P. rigida	pitch pine	r
P. serotina	pond pine	r
P. strobus	eastern white pine	c
P. sylvestris	Scotch pine[3]	vr
P. taeda	loblolly pine	vc
P. virginiana	Virginia pine	vc
Taxodium distichum var. *distichum*	baldcypress	vr
Tsuga canadensis	eastern hemlock	r
	Hardwoods	
Acer rubrum	red maple (soft)[4]	vc
A. saccharinum	silver maple	vr
A. saccharum	sugar maple (hard)	c
Betula alleghaniensis	yellow birch	r
B. lenta	sweet birch (black)	c
B. nigra	river birch	r
Carya spp.	hickory	c
Castanea dentata	American chestnut	r
Celtis occidentalis	hackberry	r
Cornus florida	flowering dogwood	c
Diospyros virginiana	common persimmon	r
Fagus grandifolia	American beech	c
Fraxinus americana	white ash	c
F. nigra	black ash	vr
F. pennsylvanica	green ash	r
Ilex opaca	American holly	c

Continued

Scientific Name[1]	*Common Name*	*Occurrence*[2]
Juglans cinerea	butternut	vr
J. nigra	black walnut	r
Liquidambar styraciflua	sweetgum	vc
Liriodendron tulipifera	yellow-poplar	vc
Magnolia acuminata var. *acuminata*	cucumbertree	r
M. virginiana	sweetbay	r
Nyssa sylvatica	blackgum (black tupelo)	c
Platanus occidentalis	American sycamore	r
Populus deltoides	eastern cottonwood	vr
P. grandidentata	bigtooth aspen	r
P. tremuloides	quaking aspen	vr
Prunus serotina	black cherry	c
Quercus alba	white oak	vc
Q. bicolor	swamp white oak	r
Q. coccinea	scarlet oak	c
Q. falcata var. *falcata*	southern red oak	c
Q. falcata var. *pagodaefolia*	cherrybark oak	r
Q. imbricaria	shingle oak	vr
Q. lyrata	overcup oak	r
Q. macrocarpa	bur oak	vr
Q. michauxii	swamp chestnut oak	r
Q. muehlenbergii	chinkapin oak	vr
Q. nigra	water oak	c
Q. palustris	pin oak	r
Q. phellos	willow oak	c
Q. prinus	chestnut oak	c
Q. rubra	northern red oak	c
Q. stellata var. *stellata*	post oak	r
Q. velutina	black oak	c
Robinia pseudoacacia	black locust	c
Salix nigra	black willow	r
Tilia americana	American basswood	r
Ulmus americana	American elm	r
U. rubra	slippery elm	r

[1]Names according to: Little, Elbert, L., Jr. 1953. Checklist of native and naturalized trees of the United States (including Alaska). U.S. Dep. Agric., Agric. Handb. 41. 472 p.

[2]Occurrence is based on the frequency of tally of commercial species, 5.0 inches dbh or larger, on Resource Evaluation field plots: vr = very rare (<0.05 percent), r = rare (0.05 to 0.49 percent), c = common (0.5 to 4.9 percent), and vc = very common (≥5.0 percent).

[3]Species introduced into Maryland.

[4]Names in parentheses are other frequently used common names.

Index to Tables[a]

Statistical Tables for the State

Table No.	
	FOREST LAND
1	Area by land class
2	Ownership class
3	Stand-size and ownership classes
4	Stand-volume and ownership classes
5	Stocking class
6	Area-condition and ownership classes
7	Potential site productivity and ownership classes
8	Forest-type group and ownership class
9	Forest-type group and stand-size class
10	Forest type and forest-type group
11	Noncommercial forest land, by forest-type group
	NUMBER OF TREES
12	By species group and tree and diameter classes
13	Growing-stock trees, by species and diameter class
	TIMBER VOLUME
14	Class of timber, softwoods and hardwoods
15	Growing-stock and sawtimber, by ownership and stand-size classes, softwoods and hardwoods
16	Growing-stock and sawtimber, by forest-type group, softwoods and hardwoods
17	Growing-stock, by species and diameter class
18	Sawtimber, by species and diameter class
19	Sawtimber, by species and quality class
	GROWTH, REMOVALS, AND MORTALITY
20	Components of average annual change of growing stock and sawtimber, by softwoods and hardwoods
21	Annual net growth, removals, and mortality of growing stock and sawtimber, by species
22	Annual net growth and removals of growing stock and sawtimber, by ownership class, softwoods and hardwoods
23	Annual mortality of growing stock and sawtimber, by ownership and cause of death, softwoods and hardwoods
	SAMPLING ERRORS
24	Major forest-area and timber-volume classes for tables 1 through 23
	OUTPUT OF TIMBER PRODUCTS (by softwoods and hardwoods)
25	By source of material
26	Roundwood products, by source
27	Removals from growing stock and sawtimber, by item
28	Unused residues, by industry and type of residue
	PROJECTIONS
29-30	Annual net growth, removals, and inventory of growing stock and sawtimber, by softwoods and hardwoods

[a]All tables with area, number of trees, and volume data are dated January 1, 1976. All tables with growth, removals, mortality, and output of timber products data are dated December 31, 1975.

Statistical Tables for Geographic Units

FOREST LAND

31 Area by land class and geographic unit
32 Ownership class and geographic unit
33 Stand-size class and geographic unit
34 Stand-volume class and geographic unit
35 Stocking-percent class and geographic unit
36 Area-condition class and geographic unit
37 Potential site productivity class and geographic unit
38 Forest-type group and geographic unit

NUMBER OF TREES

39 Growing-stock and rough and rotten trees, by diameter-class group, softwoods and hardwoods, and geographic unit
40 Growing-stock trees, Central Unit, by species and diameter class
41 Growing-stock trees, Southern Unit, by species and diameter class
42 Growing-stock trees, Lower Eastern Shore Unit, by species and diameter class
43 Growing-stock trees, Western Unit, by species and diameter class

TIMBER VOLUME

44 Class of timber and geographic unit
45 Growing stock and sawtimber, by ownership class and geographic unit
46 Growing stock and sawtimber, by stand-size class and geographic unit
47 Growing stock and sawtimber, by forest-type group and geographic unit
48 Growing stock, Central Unit, by species and diameter class
49 Growing stock, Southern Unit, by species and diameter class
50 Growing stock, Lower Eastern Shore Unit, by species and diameter class
51 Growing stock, Western Unit, by species and diameter class
52 Sawtimber, Central Unit, by species and diameter class
53 Sawtimber, Southern Unit, by species and diameter class
54 Sawtimber, Lower Eastern Shore Unit, by species and diameter class
55 Sawtimber, Western Unit, by species and diameter class
56 Sawtimber, Central Unit, by species and quality class
57 Sawtimber, Southern Unit, by species and quality class
58 Sawtimber, Lower Eastern Shore Unit, by species and quality class
59 Sawtimber, Western Unit, by species and quality class

GROWTH AND REMOVALS

60 Annual net growth and removals of growing stock and sawtimber, by softwoods and hardwoods and geographic unit

Statistical Tables for Counties

FOREST LAND

61 Area by land class and county

TIMBER VOLUME

62 Growing stock, by county, softwoods and hardwoods
63 Sawtimber, by county, softwoods and hardwoods

Table 1.—Area by land class, Maryland, 1976

Land class	Area	
	Thousand acres	*Percent*
Forest land:		
Commercial	2,522.7	40
Productive reserved	108.9	2
Urban	21.0	[a]
Unproductive	0.6	[a]
Total forest land	2,653.2	42
Nonforest land:		
Cropland[b]	1,513.7	24
Pasture	423.5	7
Other[c]	1,739.8	27
Total nonforest land	3,677.0	58
Total area[d]	6,330.2	100

[a]Less than 0.5 percent.
[b]Source: 1974 Census of Agriculture. Excludes croplands used only for pasture.
[c]Includes swampland, industrial and urban areas, other nonforest land, and 48,000 acres, classed as water by Resources Evaluation standards, but defined by the Bureau of the Census as land.
[d]Source: United States Bureau of the Census, U.S. Census of Population: 1970, Vol. I and Area Measurement Reports, Series GE-20, No. 1.

Table 2.—Area of commercial forest land, by ownership class, Maryland, 1976

Ownership class	Area	
	Thousand acres	*Percent*
Other Federal	24.9	1
State	185.2	8
County and Municipal	32.6	1
Total public	242.7	10
Forest industry	139.2	5
Farmer-owned	1,028.2	41
Miscellaneous private:		
Individual	734.6	29
Corporate	248.9	10
Other	129.1	5
Total private	2,280.0	90
All ownerships	2,522.7	100

Table 3.—Area of commercial forest land, by stand-size and ownership class, Maryland, 1976
(In thousands of acres)

Stand-size class	All ownerships	Other public	Forest industry	Farmer and other
Sawtimber stands	1,413.1	139.2	48.9	1,225.0
Poletimber stands	665.5	72.7	47.3	545.5
Sapling-seedling stands	438.2	30.8	43.0	364.4
Nonstocked areas	5.9	—	—	5.9
All classes	2,522.7	242.7	139.2	2,140.8

Table 4.—Area of commercial forest land, by stand-volume and ownership class, Maryland, 1976
(In thousands of acres)

Stand-volume per acre (board feet)[a]	All ownerships	Other public	Forest industry	Farmer and other
Less than 1,500	798.2	68.7	46.1	683.4
1,500 to 5,000	1,031.5	110.9	71.2	849.4
More than 5,000	693.0	63.1	21.9	608.0
All classes	2,522.7	242.7	139.2	2,140.8

[a]International ¼-inch rule.

Table 5.—Area of commercial forest land, by stocking class based on selected stand components, Maryland, 1976
(In thousands of acres)

Stocking class[a] (percent)	Stocking classified in terms of—				
	All trees	Growing-stock trees			Rough and rotten trees
		Total	Desirable	Acceptable	
160	5.6	—	—	—	—
150 to 159	152.9	50.4	—	41.3	—
140 to 149	323.3	108.6	—	105.7	—
130 to 139	439.8	237.9	—	196.6	—
Overstocked	921.6	396.9	—	343.6	—
120 to 129	537.5	278.3	—	248.5	—
110 to 119	433.1	293.1	—	318.3	—
100 to 109	264.3	343.8	—	338.3	6.2
Fully stocked	1,234.9	915.2	—	905.1	6.2
90 to 99	172.3	363.5	—	350.3	—
80 to 89	47.9	272.6	—	314.8	47.6
70 to 79	32.0	146.5	—	168.8	31.9
60 to 69	24.2	142.0	—	141.6	37.3
Medium stocked	276.4	924.6	—	975.5	116.8
50 to 59	24.1	86.1	—	76.2	126.8
40 to 49	18.7	82.8	—	98.9	165.4
30 to 39	5.9	49.2	—	55.5	203.8
20 to 29	35.2	36.3	38.1	36.3	407.3
10 to 19	5.9	31.6	178.9	31.6	666.9
0 to 9	—	—	2,305.7	—	829.5
Poorly stocked	89.8	286.0	2,522.7	298.5	2,399.7
All classes	2,522.7	2,522.7	2,522.7	2,522.7	2,522.7

[a]100 percent stocking equals 75 square feet of basal area per acre.

Table 6.—Area of commercial forest land, by area-condition and ownership class, Maryland, 1976
(In thousands of acres)

Area-condition class[a]	All ownerships	Other public	Forest industry	Farmer and other
Class *10-40*	—	—	—	—
Class *50*	1,234.4	101.0	101.5	1,031.9
Class *60*	977.5	96.5	33.3	847.7
Class *70*	310.8	45.2	4.4	261.2
All classes	2,522.7	242.7	139.2	2,140.8

[a]Class *10* to *40*.—Areas medium to fully stocked with desirable trees.
Class *50*.—Areas poorly stocked with desirable trees, but fully stocked with growing-stock trees.
Class *60*.—Areas poorly stocked with desirable trees, but with medium to full stocking of growing-stock trees.
Class *70*.—Areas poorly stocked with desirable trees, and poorly stocked with growing-stock trees.

Table 7.—Area of commercial forest land, by potential site productivity and ownership class, Maryland, 1976
(In thousands of acres)

Growth-per-acre class (cubic feet)	All ownerships	Other public	Forest industry	Farmer and other
120 to 165	222.2	39.8	8.7	173.7
85 to 119	759.5	67.2	37.6	654.7
50 to 84	1,130.6	74.4	65.8	990.4
20 to 49	410.4	61.3	27.1	322.0
All classes	2,522.7	242.7	139.2	2,140.8

Table 8.—Area of commercial forest land, by forest-type group and ownership class, Maryland, 1976
(In thousands of acres)

Forest-type group	All ownerships	Other public	Forest industry	Farmer and other
White and red pine	43.4	16.2	—	27.2
Spruce/fir	11.2	5.8	—	5.4
Loblolly and shortleaf pine	522.0	39.1	47.1	435.8
Oak/pine	163.1	24.3	13.1	125.7
Oak/hickory	1,161.7	107.9	40.6	1,013.2
Oak/gum/cypress	98.7	4.7	16.5	77.5
Elm/ash/red maple	322.7	28.9	17.7	276.1
Maple/beech/birch	199.9	15.8	4.2	179.9
All groups	2,522.7	242.7	139.2	2,140.8

Table 9.—Area of commercial forest land, by forest-type group and stand-size class, Maryland, 1976
(In thousands of acres)

Forest-type group	All stands	Sawtimber stands	Poletimber stands	Sapling-seedling stands[a]
White and red pine	43.4	6.3	18.6	18.5
Spruce/fir	11.2	4.6	—	6.6
Loblolly and shortleaf pine	522.0	274.1	167.5	80.4
Oak/pine	163.1	74.3	65.8	23.0
Oak/hickory	1,161.7	733.7	262.3	165.7
Oak/gum/cypress	98.7	56.0	27.6	15.1
Elm/ash/red maple	322.7	188.6	67.7	66.4
Maple/beech/birch	199.9	75.5	56.0	68.4
All groups	2,522.7	1,413.1	665.5	444.1

[a]Includes 5,900 acres of nonstocked land in the elm/ash/red maple group.

Table 10.—Area of commercial forest land by, forest type and forest-type group, Maryland, 1976

Forest type and forest-type group	Area	Sampling error
	Thousand Acres	*Percent*
Red pine	6.4	**
White pine	24.6	*
White pine/hemlock	6.2	**
Hemlock	6.2	**
TOTAL, WHITE AND RED PINE GROUP	43.4	37
White spruce	6.6	*
Norway spruce	4.6	**
TOTAL, SPRUCE/FIR GROUP	11.2	*
Loblolly pine	295.0	8
Virginia pine	217.9	14
Eastern redcedar	2.7	**
Pitch pine	6.4	**
TOTAL, LOBLOLLY AND SHORTLEAF PINE GROUP	522.0	7
Eastern redcedar/hardwood	2.7	**
Virginia pine/southern red oak	111.2	20
Loblolly pine/hardwood	49.2	24
TOTAL, OAK/PINE GROUP	163.1	15
Post or black oak	126.7	21
Chestnut oak	135.7	20
White oak/red oak/hickory	184.9	16
White oak	168.9	17
Northern red oak	38.1	39
Yellow-poplar/white oak/northern red oak	82.7	25
Sweetgum/yellow-poplar	257.0	13
Mixed hardwoods	167.7	21
TOTAL, OAK/HICKORY GROUP	1,161.7	5
Swamp chestnut oak/cherrybark oak	27.6	36
Sweetgum/willow oak	71.1	22
TOTAL, OAK/GUM/CYPRESS GROUP	98.7	19
Black ash/American elm/red maple	54.8	30
River birch/sycamore	25.9	46
Willow	5.9	**
Red maple (lowland)	58.7	23
Red maple (upland)	177.4	16
TOTAL, ELM/ASH/RED MAPLE GROUP	322.7	12
Sugar maple/beech/yellow birch	50.9	34
Black cherry	30.6	42
Black walnut	17.5	*
Mixed northern hardwoods	100.9	32
TOTAL, MAPLE/BEECH/BIRCH GROUP	199.9	19
Total, all types	2,522.7	1.7

*Sampling error of 50 to 99 percent.
**Sampling error of more than 99 percent.

Table 11.—Area of noncommercial forest land, by forest-type group, Maryland, 1976
(In thousands of acres)

Forest-type group	All areas	Productive-reserved	Urban	Unproductive
White and red pine	5.4	5.4	—	—
Spruce/fir	.4	.4	—	—
Loblolly and shortleaf pine	20.6	20.6	—	—
Oak/pine	11.4	11.4	—	—
Oak/hickory	67.0	45.4	21.0	0.6
Oak/gum/cypress	4.6	4.6	—	—
Elm/ash/red maple	15.9	15.9	—	—
Maple/beech/birch	5.2	5.2	—	—
All groups	130.5	108.9	21.0	0.6

Table 12.—Number of trees on commercial forest land by species group, and tree and diameter class, Maryland, 1976
(In thousands of trees)

Dbh class (inches)	Softwoods			Hardwoods		
	Growing-stock trees	Rough and rotten trees	Total	Growing-stock trees	Rough and rotten trees	Total
Saplings-seedlings:						
less than 1.0	46,421	181	46,602	360,695	60,456	421,151
1.0 to 2.9	52,603	19,910	72,513	390,499	385,210	775,709
3.0 to 4.9	42,176	6,534	48,710	148,108	86,687	234,795
Total	141,200	26,625	167,825	899,302	532,353	1,431,655
Poletimber:						
5.0 to 6.9	37,954	1,961	39,915	79,899	29,223	109,122
7.0 to 8.9	27,470	779	28,249	51,598	10,842	62,440
9.0 to 10.9	—	—	—	34,793	5,619	40,412
Total	65,424	2,740	68,164	166,290	45,684	211,974
Small sawtimber:						
9.0 to 10.9	14,394	581	14,975	—	—	—
11.0 to 12.9	7,747	403	8,150	21,842	3,748	25,590
13.0 to 14.9	4,173	97	4,270	14,951	2,168	17,119
Total	26,314	1,081	27,395	36,793	5,916	42,709
Large sawtimber:						
15.0 to 16.9	1,986	77	2,063	9,577	1,225	10,802
17.0 to 18.9	556	28	584	5,594	798	6,392
19.0 to 20.9	194	10	204	2,786	562	3,348
21.0 to 28.9	70	9	79	3,569	966	4,535
29.0 and larger	16	—	16	309	218	527
Total	2,822	124	2,946	21,835	3,769	25,604
All classes	235,760	30,570	266,330	1,124,220	587,722	1,711,942

Table 13.—Number of growing-stock trees on commercial forest land, by species and diameter class, Maryland, 1976
(In thousands of trees)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
White and red pine	6,232	3,490	2,046	599	—	25	48	14	10	—	—
Loblolly pine[a]	45,231	15,357	11,394	7,683	5,229	3,305	1,586	462	160	50	5
Virginia pine	39,556	17,632	13,132	5,655	2,167	619	286	56	9	—	—
Other yellow pines	1,143	362	145	179	216	186	31	24	—	—	—
Other softwoods	2,398	1,113	753	278	135	38	35	—	15	20	11
Total softwoods	94,560	37,954	27,470	14,394	7,747	4,173	1,986	556	194	70	16
Soft maples	32,507	14,708	8,555	4,254	1,873	1,264	775	502	244	316	16
Hard maples	3,112	1,244	628	674	218	140	120	26	44	18	—
Hickory	10,027	3,925	2,068	1,523	1,292	577	314	84	107	128	9
Beech	5,751	1,948	853	912	618	492	273	217	145	268	25
Sweetgum	22,627	8,897	5,897	3,219	2,143	1,177	705	286	110	185	8
Yellow-poplar	19,488	4,334	3,437	2,761	2,443	2,177	1,706	1,316	509	745	60
Blackgum	9,587	3,815	2,301	1,516	642	473	487	195	84	72	2
Ash-walnut-cherry	11,632	4,244	2,917	2,307	974	461	363	199	83	84	—
Select white oaks	32,109	11,331	6,839	5,420	3,360	2,136	1,302	754	360	540	67
Select red oaks	12,042	3,762	1,948	1,796	1,150	1,616	954	443	171	179	23
Other white oaks	16,544	4,946	4,873	2,440	1,827	1,135	509	414	215	170	15
Other red oaks	32,492	9,387	7,153	5,356	4,005	2,591	1,673	965	573	720	69
Black locust	3,871	1,285	1,094	808	421	179	33	31	14	6	—
Other hardwoods	13,129	6,073	3,035	1,807	876	533	363	162	127	138	15
Total hardwoods	224,918	79,899	51,598	34,793	21,842	14,951	9,577	5,594	2,786	3,569	309
All species	319,478	117,853	79,068	49,187	29,589	19,124	11,563	6,150	2,980	3,639	325

[a]Includes 1,003,000 pond pine and 239,000 shortleaf pine trees.

Table 14.—Net volume of timber on commercial forest land, by class of timber, softwoods and hardwoods, Maryland, 1976
(In millions of cubic feet)

Class of timber	All species	Softwoods	Hardwoods
Sawtimber trees:			
Sawlog portion	1,927.4	465.2	1,462.2
Upper-stem portion	393.6	65.0	328.6
All sawtimber trees	2,321.0	530.2	1,790.8
Poletimber trees	1,171.1	262.8	908.3
All growing-stock trees	3,492.1	793.0	2,699.1
Rough trees	285.0	20.7	264.3
Rotten trees	111.7	3.5	108.2
Total, all trees	3,888.8	817.2	3,071.6

Table 15.—Net volume of growing stock and sawtimber on commercial forest land, by ownership and stand-size class, softwoods and hardwoods, Maryland, 1976

Ownership or stand-size class	Growing stock (Million cubic feet)			Sawtimber (Million board feet)[a]		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	BY OWNERSHIP CLASSES					
Other public	342.1	81.9	260.2	697.2	121.2	576.0
Forest industry	188.4	91.2	97.2	372.1	223.7	148.4
Farmer and other	2,961.6	619.9	2,341.7	7,097.3	1,381.5	5,715.8
All ownership	3,492.1	793.0	2,699.1	8,166.6	1,726.4	6,440.2
	BY STAND-SIZE CLASSES					
Sawtimber stands	2,557.9	522.3	2,035.6	7,047.6	1,403.8	5,643.8
Poletimber stands	798.8	235.3	563.5	907.6	272.1	635.5
Sapling-seedling stands	135.4	35.4	100.0	211.4	50.5	160.9
All classes	3,492.1	793.0	2,699.1	8,166.6	1,726.4	6,440.2

[a]International ¼-inch rule.

Table 16.—Net volume of growing stock and sawtimber on commercial forest land, by forest-type group, softwoods and hardwoods, Maryland, 1976

Forest-type group	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	(Million cubic feet)			*(Million board feet)*[a]		
White and red pine	43.0	40.0	3.0	24.9	23.5	1.4
Spruce/fir	4.8	3.4	1.4	9.5	8.2	1.3
Loblolly and shortleaf pine	829.8	594.6	235.2	1,720.4	1,326.7	393.7
Oak/pine	188.8	60.8	128.0	370.7	126.1	244.6
Oak/hickory	1,721.3	56.6	1,664.7	4,400.3	145.2	4,255.1
Oak/gum/cypress	148.0	12.4	135.6	351.3	30.1	321.2
Elm/ash/red maple	388.3	22.0	366.3	930.4	62.4	868.0
Maple/beech/birch	168.1	3.2	164.9	359.1	4.2	354.9
All groups	3,492.1	793.0	2,699.1	8,166.6	1,726.4	6,440.2

[a]International ¼-inch rule.

Table 17.—Net volume of growing stock on commercial forest land, by species and diameter class, Maryland, 1976
(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
White and red pine	42.1	17.8	15.2	6.3	—	.4	1.5	.4	.5	—	—
Loblolly pine[a]	482.9	36.5	67.7	88.7	99.5	91.3	61.2	23.2	10.0	4.1	.7
Virginia pine	236.8	44.9	72.3	56.4	34.6	15.4	9.9	2.7	.6	—	—
Other yellow pines	13.9	.9	.7	1.6	3.8	4.5	1.2	1.2	—	—	—
Other softwoods	17.3	3.3	3.5	2.5	1.8	.7	1.1	—	.9	1.3	2.2
Total softwoods	793.0	103.4	159.4	155.5	139.7	112.3	74.9	27.5	12.0	5.4	2.9
Soft maples	280.6	45.3	49.5	43.2	29.3	30.4	24.4	20.8	12.6	23.0	2.1
Hard maples	33.5	5.2	4.2	7.5	4.0	3.6	4.4	1.1	2.2	1.3	—
Hickory	114.8	12.4	12.6	16.8	23.2	15.4	11.2	4.5	6.7	10.8	1.2
Beech	95.2	5.4	4.7	9.0	10.1	12.1	10.0	10.0	8.3	22.1	3.5
Sweetgum	221.1	27.2	34.6	33.6	37.3	29.5	24.2	12.8	6.1	14.7	1.1
Yellow-poplar	350.5	13.8	20.5	28.5	39.4	51.4	54.1	54.0	26.9	52.4	9.5
Blackgum	98.8	11.1	13.7	16.0	10.7	11.4	16.6	8.8	4.7	5.5	.3
Ash-walnut-cherry	117.2	13.3	17.3	25.0	17.2	11.9	12.2	9.0	4.7	6.6	—
Select white oaks	399.5	29.6	38.1	56.0	57.9	53.8	47.0	35.8	22.5	47.6	11.2
Select red oaks	186.0	11.2	12.1	19.4	19.3	41.7	33.2	20.9	9.7	15.0	3.5
Other white oaks	180.2	16.3	28.7	24.4	28.6	25.2	15.2	16.9	10.9	12.0	2.0
Other red oaks	468.1	29.7	44.0	60.5	68.7	64.7	58.3	45.0	32.7	54.7	9.8
Black locust	32.8	3.8	6.1	7.6	7.1	4.2	1.1	1.5	.9	.5	—
Other hardwoods	120.8	16.3	16.5	17.6	15.1	14.0	12.2	7.8	6.9	11.7	2.7
Total hardwoods	2,699.1	240.6	302.6	365.1	367.9	369.3	324.1	248.9	155.8	277.9	46.9
All species	3,492.1	344.0	462.0	520.6	507.6	481.6	399.0	276.4	167.8	283.3	49.8

[a]Includes 9,500,000 cubic feet of pond pine and 3,000,000 of shortleaf pine.

Table 18.—Net volume of sawtimber on commercial forest land, by species and diameter class, Maryland, 1976
(In millions of board feet)[a]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
White and red pine	29.1	18.6	—	1.2	5.3	1.8	2.2	—	—
Loblolly pine[b]	1,238.9	256.2	313.8	309.5	218.1	85.1	37.4	16.0	2.8
Virginia pine	378.1	164.8	111.7	54.0	36.0	9.7	1.9	—	—
Other yellow pines	42.3	5.1	12.5	15.9	4.5	4.3	—	—	—
Other softwoods	38.0	7.9	6.0	2.2	3.9	—	3.6	5.0	9.4
Total softwoods	1,726.4	452.6	444.0	382.8	267.8	100.9	45.1	21.0	12.2
Soft maples	515.3	—	90.0	102.3	89.4	81.6	49.5	92.8	9.3
Hard maples	50.5	—	11.4	10.9	13.3	3.7	7.1	4.1	—
Hickory	253.4	—	69.1	53.1	41.5	16.1	26.6	42.2	4.8
Beech	287.8	—	30.5	42.4	37.3	38.4	32.2	91.9	15.1
Sweetgum	454.8	—	114.1	106.5	91.7	50.9	24.8	62.2	4.6
Yellow-poplar	1,070.0	—	116.5	177.3	201.2	211.0	105.7	218.0	40.3
Blackgum	213.2	—	33.0	40.1	62.9	35.0	19.0	22.0	1.2
Ash-walnut-cherry	211.0	—	49.9	38.6	44.6	33.7	17.9	26.3	—
Select white oaks	1,005.4	—	177.5	187.0	171.4	135.3	88.5	198.7	47.0
Select red oaks	481.0	—	56.8	131.6	114.0	75.8	37.9	52.9	12.0
Other white oaks	381.5	—	83.2	82.6	52.8	64.4	42.7	47.3	8.5
Other red oaks	1,216.0	—	208.1	224.8	214.4	172.4	128.4	225.9	42.0
Black locust	49.8	—	20.5	14.0	4.1	5.6	3.3	2.3	—
Other hardwoods	250.5	—	44.3	46.3	44.5	29.5	26.3	48.3	11.3
Total hardwoods	6,440.2	—	1,105.3	1,257.5	1,183.1	953.4	609.9	1,134.9	196.1
All species	8,166.6	452.6	1,549.3	1,640.3	1,450.9	1,054.3	655.0	1,155.9	208.3

[a]International ¼-inch rule.
[b]Includes 20,400,000 board feet of pond pine and 6,800,000 of shortleaf pine.

Table 19.—Net volume of sawtimber on commercial forest land, by species and quality class, Maryland, 1976
(In millions of board feet)[a]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[b]
Softwoods:					
White and red pine	29.1	1.5	3.4	19.0[c]	5.2
Loblolly pine[d]	1,238.9	352.3	176.4	710.2	—
Virginia pine	378.1	7.8	12.5	357.8	—
Other yellow pines	42.3	—	4.8	37.5	—
Other softwoods[e]	38.0	—	—	—	—
Total softwoods	1,726.4	361.6	197.1	1,124.5	5.2
Hardwoods:					
Soft maples	515.3	30.4	61.0	309.0	114.9
Hard maples	50.5	5.1	6.5	19.3	19.6
Hickory	253.4	21.4	61.5	111.4	59.1
Beech	287.8	9.7	11.9	146.9	119.3
Sweetgum	454.8	64.0	71.5	183.3	136.0
Yellow-poplar	1,070.0	186.9	227.4	425.4	230.3
Blackgum	213.2	41.4	48.0	101.8	22.0
Ash-walnut-cherry	211.0	26.5	57.6	94.1	32.8
Select white oaks	1,005.4	127.3	202.5	409.8	265.8
Select red oaks	481.0	57.4	130.7	222.3	70.6
Other white oaks	381.5	44.8	84.6	164.1	88.0
Other red oaks	1,216.0	157.6	259.0	463.5	335.9
Black locust	49.8	1.9	4.4	32.7	10.8
Other hardwoods	250.5	31.9	56.1	127.2	35.3
Total hardwoods	6,440.2	806.3	1,282.7	2,810.8	1,540.4
			(In percent)		
Hardwood quality	100	12	20	44	24

[a]International ¼-inch rule.
[b]Grade 4 applies only to white pine. For hardwoods the volumes in this column are for construction logs.
[c]This includes 5.2 million board feet of red pine.
[d]This includes 20.4 million board feet of pond pine and 6.8 million board feet of shortleaf pine.
[e]Softwood species other than pine are not graded into standard-lumber grades.

Table 20.—Components of average annual net change of growing stock and sawtimber on commercial forest land, softwoods and hardwoods, Maryland 1950-75

Component	All species	Soft-woods	Hard-woods
	GROWING STOCK *Thousand cubic feet*		
Growth on initial growing-stock inventory[a]	93,347	20,479	72,868
Ingrowth—trees that became 5.0″ dbh or larger	31,670	10,496	21,174
Gross growth	125,017	30,975	94,042
Cull increment	− 6,817	− 825	− 5,992
Annual mortality	−14,950	−4,150	−10,800
Average annual:			
Net growth	103,250	26,000	77,250
Removals	−77,600	−24,700	−52,900
Inventory change	25,650	1,300	24,350
	SAWTIMBER *Thousand board feet*[b]		
Growth on initial sawtimber inventory[a]	125,599	31,647	93,952
Ingrowth—trees that became sawtimber size	181,417	48,526	132,891
Gross growth	307,016	80,173	226,843
Cull increment	−14,516	− 673	−13,843
Annual mortality	−22,500	−6,500	−16,000
Average annual:			
Net growth	270,000	73,000	197,000
Removals	−193,000	−66,000	−127,000
Inventory change	77,000	7,000	70,000

[a]Including growth on trees that were cut.
[b]International ¼-inch rule.

Table 21.—Annual net growth, removals, and mortality of growing stock and sawtimber on commercial forest land, by species, Maryland, 1975

Species	Growing stock			Sawtimber		
	Annual net growth	Annual timber removals[a]	Annual mortality	Annual net growth	Annual timber removals[a]	Annual mortality
	Thousand cubic feet			*Thousand board feet*[b]		
Softwoods:						
Loblolly and shortleaf pine	18,292	17,103	1,518	55,096	49,280	2,573
Other softwoods	6,608	6,497	2,682	19,904	18,720	4,427
Total softwoods	24,900	23,600	4,200	75,000	68,000	7,000
Hardwoods:						
White oaks	12,252	6,425	2,625	31,733	15,906	4,048
Red oaks	20,161	13,552	2,175	52,217	33,551	2,775
Yellow-poplar	11,473	8,762	1,878	29,715	21,692	3,809
Sweetgum	9,468	11,449	1,719	24,522	28,345	3,258
Hickory	2,450	1,635	986	6,345	4,048	1,603
Red maple	11,695	6,425	791	30,290	15,907	1,320
Other hardwoods	18,601	13,552	1,726	48,178	33,551	1,187
Total hardwoods	86,100	61,800	11,900	223,000	153,000	18,000
Total, all species	111,000	85,400	16,100	298,000	221,000	25,000

[a]Data for timber removals in this table are based on the trend from 1950 to 1975 and differ from those shown in table 27. Table 27 reports the results of a canvass of timber removals for 1975.
[b]International ¼-inch rule.

Table 22.—Annual net growth and removals of growing stock and sawtimber on commercial forest land, by ownership class, softwoods and hardwoods, Maryland, 1975

Ownership	Annual net growth			Annual timber removals[a]		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	GROWING STOCK (*Thousand cubic feet*)					
Other public	8,773	978	7,795	1,784	910	874
Forest industry	6,785	3,842	2,943	9,311	7,799	1,512
Farmer and other	95,442	20,080	75,362	74,305	14,891	59,414
All ownerships	111,000	24,900	86,100	85,400	23,600	61,800
	SAWTIMBER (*Thousand board feet*)[b]					
Other public	22,034	3,541	18,493	4,786	2,622	2,164
Forest industry	16,530	11,338	5,192	26,215	22,472	3,743
Farmer and other	259,436	60,121	199,315	189,999	42,906	147,093
All ownerships	298,000	75,000	223,000	221,000	68,000	153,000

[a]Data for timber removals in this table are based on the trend from 1950 to 1975 and differ from those shown in table 27. Table 27 reports the results of a canvass of timber removals for 1975.
[b]International ¼-inch rule.

Table 23.—Annual mortality of growing stock and sawtimber on commercial forest land, softwoods and hardwoods, Maryland, 1975

Ownership and cause	Growing stock (Thousand cubic feet)			Sawtimber (Thousand board feet)[a]		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
			BY OWNERSHIP			
Other public	1,617	654	963	2,053	762	1,291
Forest industry	620	309	311	945	532	413
Farmer and other	13,863	3,237	10,626	22,002	5,706	16,296
All ownerships	16,100	4,200	11,900	25,000	7,000	18,000
			BY CAUSE			
Disease	3,337	613	2,724	5,136	1,564	3,572
Weather	5,050	1,116	3,934	2,105	2,105	—
Logging	392	135	257	1,001	193	808
Suppression	537	342	195	337	337	—
Unknown	6,784	1,994	4,790	16,421	2,801	13,620
All causes	16,100	4,200	11,900	25,000	7,000	18,000

[a]International ¼-inch rule.

Table 24.—Sampling errors for major forest-area and timber-volume classes, Maryland, 1976

Table No.	Item classification	Sampling error
	FOREST AREA	
		Percent
1	Forest-land area:	
	Commercial	1.7
	Unproductive	37
	Total forest	1.6
2	Ownership[a]:	
	Forest industry	18
	Farmer-owned	4
	Misc. private-individual	5
	corporate	8
	other	12
3	Stand-size class:	
	Sawtimber	4
	Poletimber	7
	Sapling-seedling	11
	Nonstocked areas	**
4	Stand-volume per acre (board feet):	
	Less than 1,500	7
	1,500 to 5,000	6
	More than 5,000	7
6	Area-condition class:	
	Class *50*	5
	Class *60*	6
	Class *70*	15
7	Growth-per-acre class (cubic feet):	
	120 to 165	15
	85 to 119	8
	50 to 84	6
	20 to 49	11

Table No.	Item classification	Sampling error	
		Percent	
		All trees	*Growing stock*
5	Stocking class (in percent):		
	160	*	—
	150 to 159	16	26
	140 to 149	11	18
	130 to 139	10	13
	Overstocked	6	9
	120 to 129	9	12
	110 to 119	10	12
	100 to 109	13	11
	Fully stocked	5	6
	90 to 99	21	11
	80 to 89	32	13
	70 to 79	37	18
	60 to 69	47	19
	Medium stocked	15	6
	50 to 59	46	25
	40 to 49	*	37
	30 to 39	**	34
	20 to 29	*	39
	10 to 19	**	*
	0 to 9	—	—
	Poorly stocked	34	16

Table No.	Item classification	Sampling error	
	NUMBER OF TREES		
		Percent	
		Soft-woods	*Hard-woods*
12	Growing-stock trees (dbh class):		
	5.0 to 6.9	12	5
	7.0 to 8.9	10	5
	9.0 to 10.9	—	4
	Poletimber	10	4
	9.0 to 10.9	8	—
	11.0 to 12.9	8	5
	13.0 to 14.9	10	5
	Small sawtimber	5	3
	15.0 to 16.9	13	5
	17.0 to 18.9	19	6
	19.0 to 20.9	22	8
	21.0 to 28.9	31	8
	29.0 and larger	47	15
	Large sawtimber	10	3
	All classes	8	3

Continued

Table 24.—Continued

Table No.	Item	Sampling error
		Percent
13	Species:	
	White and red pine	*
	Loblolly-shortleaf pine	9
	Virginia pine	13
	Other yellow pine	35
	Other softwoods	30
	All softwoods	8
	Soft maples	7
	Hard maple	28
	Hickory	12
	Beech	14
	Sweetgum	11
	Yellow-poplar	11
	Blackgum	11
	Ash-walnut-cherry	14
	Select white oaks	9
	Select red oaks	11
	Other white oaks	15
	Other red oaks	8
	Black locust	22
	Other hardwoods	12
	All hardwoods	3
	All species	3

TIMBER VOLUME

		Percent	
		Cubic feet	*Board feet*
14	Class of timber:		
	Sawtimber trees	3	—
	Poletimber trees	4	—
	All growing stock	2	—
	Rough trees	7	—
	Rotten trees	7	—
	All live trees	2	—
15	Ownership and stand-size:		
	Other public	16	17
	Forest industry	19	22
	Farmer and other	3	4
	Sawtimber	3	3
	Poletimber	9	11
	Sapling-seedling	14	19
16	Forest-type group:		
	White and red pine	*	*
	Spruce/balsam fir	**	**
	Loblolly and shortleaf pine	7	9
	Oak/pine	17	18
	Oak/hickory	5	6
	Oak/gum/cypress	22	24
	Elm/ash/red maple	14	15
	Maple/beech/birch	21	24
17-18	Diameter class (inches):		
	5.0 to 6.9	6	—
	7.0 to 8.9	5	—
	9.0 to 10.9[b]	4	9
	11.0 to 12.9	4	5
	13.0 to 14.9	4	5
	15.0 to 16.9	5	5
	17.0 to 18.9	6	6
	19.0 to 20.9	7	7
	21.0 to 28.9	7	7
	29.0 and larger	40	14
	Species:		
	White and red pine	*	*
	Loblolly-shortleaf pine	7	8
	Virginia pine	12	14
	Other yellow pines	39	42
	Other softwoods	31	37
	All softwoods	6	7
	Soft maples	8	11
	Hard maple	31	42
	Hickory	11	14
	Beech	16	19
	Sweetgum	9	12
	Yellow-poplar	10	11
	Blackgum	10	14
	Ash-walnut-cherry	14	16
	Select white oaks	7	8
	Select red oaks	12	14
	Other white oaks	13	16
	Other red oaks	7	7
	Black locust	25	40
	Other hardwoods	13	17
	All hardwoods	3	4
	All species	2	3

Continued

Table 24.—Continued

Table No.	Item	Sampling error		Table No.	Item	Sampling error	
	GROWTH-REMOVALS				MORTALITY		
		Percent				*Percent*	
		Cubic feet	*Board feet*			*Cubic feet*	*Board feet*
20	Components of change:			23	By species group:		
	Gross growth	27	28		Softwoods	24	35
	Cull increment	19	27		Hardwoods	46	23
	Annual mortality	33	19				
	Annual net growth	31	42				
	Annual removals	18	20	23	By cause:		
	Inventory change	*	**		Disease	36	46
					Weather	*	*
22	Growth by:				Logging	40	*
	Softwoods	31	22		Suppression	38	**
	Hardwoods	36	49		Unknown	17	23
22	Removals by:						
	Softwoods	29	32				
	Hardwoods	20	23				

*Sampling errors of 50 to 99 percent.
**Sampling errors of 100 percent and over.
[a]Public ownership classes have no sampling errors.
[b]Board-foot sampling error for this class is for softwoods only.

Table 25.—Output of timber products, by source of material, softwoods and hardwoods, Maryland, 1975

Product and species group	Standard unit	Total output		Output from roundwood		Output from plant byproducts	
		Number of units	Thousand cubic feet	Number of units	Thousand cubic feet	Number of units	Thousand cubic feet
Sawlogs:							
Softwood	M bd ft[a]	31,268	5,251	31,268	5,251	—	—
Hardwood	M bd ft	121,371	18,325	121,371	18,325	—	—
Total	M bd ft	152,639	23,576	152,639	23,576	—	—
Veneer logs and bolts:							
Softwood	M bd ft[a]	16,487	2,770	16,487	2,770	—	—
Hardwood	M bd ft	5,303	801	5,303	801	—	—
Total	M bd ft	21,790	3,571	21,790	3,571	—	—
Pulpwood:							
Softwood	Std cords[b]	159,784	13,582	103,984	8,839	55,800	4,743
Hardwood	Std cords	106,345	9,039	61,203	5,202	45,142	3,837
Total	Std cords	266,129	22,621	165,187	14,041	100,942	8,580
Cooperage logs and bolts:							
Softwood	M bd ft[a]	158	27	158	27	—	—
Hardwood	M bd ft	1,372	207	1,372	207	—	—
Total	M bd ft	1,530	234	1,530	234	—	—
Piling:							
Softwood	M linear ft	2,615	1,049	2,615	1,049	—	—
Hardwood	M linear ft	240	144	240	144	—	—
Total	M linear ft	2,855	1,193	2,855	1,193	—	—
Poles:							
Softwood	M pieces	41	97	41	97	—	—
Hardwood	M pieces	—	—	—	—	—	—
Total	M pieces	41	97	41	97	—	—
Posts (round and split):							
Softwood	M pieces	—	—	—	—	—	—
Hardwood	M pieces	43	36	43	36	—	—
Total	M pieces	43	36	43	36	—	—
Mine timbers (round):							
Softwood	M ft³	—	—	—	—	—	—
Hardwood	M ft³	13	13	13	13	—	—
Total	M ft³	13	13	13	13	—	—
Other:[c]							
Softwood	M ft³	8	8	—	—	8	8
Hardwood	M ft³	833	833	25	25	808	808
Total	M ft³	841	841	25	25	816	816
Total industrial products:							
Softwood	M ft³		22,784		18,033		4,751
Hardwood	M ft³		29,398		24,753		4,645
Total	M ft³		52,182		42,786		9,396

Continued

Table 25.—Continued

Product and species group	Standard unit	Total output		Output from roundwood		Output from plant byproducts	
		Number of units	Thousand cubic feet	Number of units	Thousand cubic feet	Number of units	Thousand cubic feet
Fuelwood:							
Softwood	Std cords[d]	10,387	831	—	—	10,387	831
Hardwood	Std cords	17,048	1,364	4,460	357	12,588	1,007
Total	Std cords	27,435	2,195	4,460	357	22,975	1,838
All products:[e]							
Softwood	M ft³		23,615		18,033		5,582
Hardwood	M ft³		30,762		25,110		5,652
Total	M ft³		54,377		43,143		11,234

[a]International ¼-inch rule.
[b]Rough wood basis, includes chips converted to equivalent standard cords, 85 ft³ of solid wood.
[c]Includes hewn ties, excelsior bolts, shingle bolts, and chemical wood.
[d]Rough wood basis, includes chips converted to equivalent standard cords, 80 ft³ of solid wood.
[e]Does not include 1,076,000 ft³ of softwood and 3,740,000 ft³ of hardwood residues used for agricultural bedding.

Table 26.—Output of roundwood products, by source, softwoods and hardwoods, Maryland, 1975
(In thousands of cubic feet)

Product and species group	All sources	Growing-stock trees[a]			Rough and rotten trees[a]	Salvable dead trees[a]	Other sources[b]
		Total	Saw-timber	Pole-timber			
PRINCIPAL INDUSTRIAL PRODUCTS							
Sawlogs:							
Softwood	5,251	4,808	4,741	67	—	35	408
Hardwood	18,325	17,838	17,610	228	17	116	354
Total	23,576	22,646	22,351	295	17	151	762
Veneer logs and bolts:							
Softwood	2,770	2,554	2,518	36	—	—	216
Hardwood	801	785	775	10	—	—	16
Total	3,571	3,339	3,293	46	—	—	232
Pulpwood:							
Softwood	8,839	7,131	4,995	2,136	—	—	1,708
Hardwood	5,202	4,101	3,152	949	514	6	581
Total	14,041	11,232	8,147	3,085	514	6	2,289
MISCELLANEOUS INDUSTRIAL PRODUCTS							
Cooperage logs and bolts:							
Softwood	27	26	23	3	—	—	1
Hardwood	207	199	176	23	—	—	8
Total	234	225	199	26	—	—	9
Piling:							
Softwood	1,049	970	889	81	—	—	79
Hardwood	144	142	115	27	—	—	2
Total	1,193	1,112	1,004	108	—	—	81

Continued

Table 26.—Continued

Product and species group	All sources	Growing-stock trees[a]			Rough and rotten trees[a]	Salvable dead trees[a]	Other sources[b]
		Total	Sawtimber	Poletimber			
Poles:							
Softwood	97	90	82	8	—	—	7
Hardwood	—	—	—	—	—	—	—
Total	97	90	82	8	—	—	7
Posts (round and split):							
Softwood	—	—	—	—	—	—	—
Hardwood	36	35	28	7	—	—	1
Total	36	35	28	7	—	—	1
Mine timbers (round):							
Softwood	—	—	—	—	—	—	—
Hardwood	13	10	8	2	1	—	2
Total	13	10	8	2	1	—	2
Other:							
Softwood	—	—	—	—	—	—	—
Hardwood	25	25	—	25	—	—	—
Total	25	25	—	25	—	—	—
TOTAL INDUSTRIAL PRODUCTS							
Softwood	18,033	15,579	13,248	2,331	—	35	2,419
Hardwood	24,753	23,135	21,864	1,271	532	122	964
Total	42,786	38,714	35,112	3,602	532	157	3,383
NONINDUSTRIAL PRODUCTS							
Fuelwood:							
Softwood	—	—	—	—	—	—	—
Hardwood	357	281	216	65	35	1	40
Total	357	281	216	65	35	1	40
ALL PRODUCTS							
Softwood	18,033	15,579	13,248	2,331	—	35	2,419
Hardwood	25,110	23,416	22,080	1,336	567	123	1,004
Total	43,143	38,995	35,328	3,667	567	158	3,423

[a]On commercial forest land.
[b]Includes trees less than 5.0 inches in diameter, tree tops and limbs from commercial forest areas, or any material from noncommercial forest land or nonforest land such as fence rows and suburban areas.

Table 27.—Timber removals from growing stock and sawtimber on commercial forest land, by item, softwoods and hardwoods, Maryland, 1975

Item	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	Thousand cubic feet			*Thousand board feet*[a]		
Roundwood products:						
Sawlogs	22,646	4,808	17,838	107,698	17,491	90,207
Veneer logs and bolts	3,339	2,554	785	13,260	9,290	3,970
Pulpwood	11,232	7,131	4,101	23,343	15,672	7,671
Cooperage logs and bolts	225	26	199	991	89	902
Piling	1,112	970	142	3,660	3,168	492
Poles	90	90	—	292	292	—
Posts	35	—	35	120	—	120
Mine timbers	10	—	10	19	—	19
Other	25	—	25	—	—	—
Fuelwood	281	—	281	526	—	526
All products	38,995	15,579	23,416	149,909	46,002	103,907
Logging residues	12,280	2,901	9,379	8,902	1,817	7,085
Other removals	7,621	1,414	6,207	14,636	2,243	12,393
Total removals	58,896	19,894	39,002	173,447	50,062	123,385

[a]International ¼-inch rule.

Table 28.—Volume of unused residues at primary manufacturing plants, by industry and type of residue, softwoods and hardwoods, Maryland, 1975
(In thousands of cubic feet)

Species group and type of residue	All industries	Lumber	Veneer and plywood	Other
Softwoods:				
Coarse[a]	24	24	—	—
Fine[b]	10	10	—	—
Total	34	34	—	—
Hardwoods:				
Coarse[a]	151	148	—	3
Fine[b]	268	264	—	4
Total	419	412	—	7
All species:				
Coarse[a]	175	172	—	3
Fine[b]	278	274	—	4
Total	453	446	—	7

[a]Material, such as slabs, edgings, and veneer cores.
[b]Material, such as sawdust and shavings.

Table 29.—Projection of annual net growth, annual timber removals, and inventory of growing stock and sawtimber on commercial forest land in Maryland, 1976-2006[a]

Species group	1976 (inventory year)	1986	1996	2006
		GROWING STOCK (*Million cubic feet*)		
Softwoods:				
Removals	23	25	25	25
Growth	25	25	25	25
Inventory	793	801	806	808
Hardwoods:				
Removals	62	74	87	98
Growth	86	92	97	98
Inventory	2,699	2,910	3,043	3,086
Total:				
Removals	85	99	112	123
Growth	111	117	122	123
Inventory	3,492	3,711	3,849	3,894
		SAWTIMBER (*Million board feet*)[b]		
Softwoods:				
Removals	68	74	74	74
Growth	75	75	75	75
Inventory	1,727	1,744	1,755	1,760
Hardwoods:				
Removals	153	183	215	242
Growth	223	239	252	254
Inventory	6,440	6,943	7,261	7,363
Total:				
Removals	221	257	289	316
Growth	298	314	327	329
Inventory	8,167	8,687	9,016	9,123

[a]Based upon the following assumptions: The area of commercial forest land will remain constant at 2,522,700 acres. Total growing-stock growth and removals will be in balance at 3.2 percent of the inventory at the end of 30 years.
[b]International ¼-inch rule.

Table 30.—Projection of annual net growth, annual timber removals, and inventory of growing stock and sawtimber on commercial forest land in Maryland, 1976-2006[a]

Species group	1976 (inventory year)	1986	1996	2006
		GROWING STOCK (*Million cubic feet*)		
Softwoods:				
Removals	23	25	27	29
Growth	25	26	27	28
Inventory	793	804	807	802
Hardwoods:				
Removals	62	61	60	58
Growth	86	84	82	80
Inventory	2,699	2,809	2,920	3,023
Total:				
Removals	85	86	87	87
Growth	111	110	109	108
Inventory	3,492	3,613	3,727	3,825
		SAWTIMBER (*Million board feet*)[b]		
Softwoods:				
Removals	68	74	80	86
Growth	75	78	81	84
Inventory	1,727	1,751	1,757	1,747
Hardwoods:				
Removals	153	151	148	143
Growth	223	218	213	207
Inventory	6,440	6,702	6,967	7,213
Total:				
Removals	221	225	228	229
Growth	298	296	294	291
Inventory	8,167	8,453	8,724	8,960

[a]Based upon the following assumptions: The area of commercial forest land will decline from 2,522,700 acres in 1976 to 2,305,000 by 2006. Growth per acre will generally increase throughout the State, but increases will be larger on the Lower Eastern Shore with intensified management of loblolly pine stands. Removals per acre will increase in all regions except western Maryland where a modest decline is expected.
[b]International ¼-inch rule.

Table 31.—Land area of Maryland, by land class and geographic unit, 1976
(In thousands of acres)

Geographic unit	Commercial forest land	Productive-reserved forest land	Other land forest	Total forest land	Nonforest land	All land
Central	1,105.5	95.9	17.8	1,219.5	2,596.5	3,815.7
Southern	376.1	2.1	3.5	381.7	289.6	671.3
Lower Eastern Shore	523.0	3.1	—	526.1	621.4	1,147.5
Western	518.1	7.8	.3	526.2	169.5	695.7
Total, all units	2,522.7	108.9	21.6	2,653.2	3,677.0	6,330.2

Table 32.—Area of commercial forest land in Maryland, by ownership class and geographic unit, 1976
(In thousands of acres)

Ownership class	Central	Southern	Lower Eastern Shore	Western	Total
Federal	20.9	3.7	—	0.3	24.9
State	38.7	4.9	27.8	113.8	185.2
County and municipal	30.4	—	—	2.2	32.6
Total public	90.0	8.6	27.8	116.3	242.7
Forest industry	16.9	11.7	97.7	12.9	139.2
Farmer-owned	478.3	181.0	225.9	143.0	1,028.2
Miscellaneous private:					
Individual	316.8	125.9	124.1	167.8	734.6
Corporate	135.0	27.9	29.2	56.8	248.9
Other	68.5	21.0	18.3	21.3	129.1
Total private	1,015.5	367.5	495.2	401.8	2,280.0
All ownerships	1,105.2	376.1	523.0	518.1	2,522.7
Sampling error (in percent)	3	3	2	2	2

Table 33.—Area of commercial forest land in Maryland, by stand-size class and geographic unit, 1976
(In thousands of acres)

Geographic unit	Sawtimber stands	Poletimber stands	Other stands	All classes
Central	717.4	236.2	151.9	1,105.5
Southern	227.8	85.1	63.2	376.1
Lower Eastern Shore	273.0	172.1	77.9	523.0
Western	194.9	172.1	151.1	518.1
Total, all units	1,413.1	665.5	444.1	2,522.7

Table 34.—Area of commercial forest land in Maryland, by stand-volume class and geographic unit, 1976
(In thousands of acres)

Geographic unit	Stand-volume per acre (board feet)[a]			All classes
	Fewer than 1,500	1,500-5,000	More than 5,000	
Central	240.8	462.8	401.9	1,105.5
Southern	97.7	198.9	79.5	376.1
Lower Eastern Shore	156.3	194.1	172.6	523.0
Western	303.4	175.7	39.0	518.1
Total, all units	798.2	1,031.5	693.0	2,522.7

[a]International ¼-inch rule.

Table 35.—Area of commercial forest land in Maryland, by stocking-percent class and geographic unit, 1976
(In thousands of acres)

Geographic unit	Stocking class (growing-stock trees)				All classes
	Over-stocked	Fully stocked	Medium stocked	Poorly stocked	
Central	175.0	434.4	386.1	110.0	1,105.5
Southern	37.1	177.0	154.0	8.0	376.1
Lower Eastern Shore	178.4	215.8	113.0	15.8	523.0
Western	6.4	88.0	271.5	152.2	518.1
Total, all units	396.9	915.2	924.6	286.0	2,522.7

Table 36.—Area of commercial forest land in Maryland, by area condition class and geographic unit, 1976
(In thousands of acres)

Geographic unit	Area condition class			All classes
	Class 50	Class 60	Class 70	
Central	563.4	426.3	115.8	1,105.5
Southern	211.5	156.6	8.0	376.1
Lower Eastern Shore	391.1	116.1	15.8	523.0
Western	68.4	278.5	171.2	518.1
Total, all units	1,234.4	977.5	310.8	2,522.7

Table 37.—Area of commercial forest land in Maryland, by potential site productivity class and geographic unit, 1976
(In thousands of acres)

Geographic unit	Growth-per-acre class (cubic feet)				All classes
	120 to 165	85 to 119	50 to 84	20 to 49	
Central	111.3	368.5	478.6	147.1	1,105.5
Southern	13.1	108.5	182.9	71.6	376.1
Lower Eastern Shore	28.2	138.0	265.9	90.9	523.0
Western	69.6	144.5	203.2	100.8	518.1
Total, all units	222.2	759.5	1,130.6	410.4	2,522.7

Table 38.—Area of commercial forest land in Maryland, by forest-type group and geographic unit, 1976
(In thousands of acres)

Forest-type group	Central	Southern	Lower Eastern Shore	Western	Total
White and red pine	12.0	—	—	31.4	43.4
Spruce/fir	—	—	—	11.2	11.2
Loblolly and shortleaf pine	142.0	94.9	253.5	31.6	522.0
Oak/pine	47.3	52.8	44.0	19.0	163.1
Oak/hickory	680.1	172.8	68.8	240.0	1,161.7
Oak/gum/cypress	23.7	21.2	53.8	—	98.7
Elm/ash/red maple	116.3	26.4	96.8	83.2	322.7
Maple/beech/birch	84.1	8.0	6.1	101.7	199.9
Total, all groups	1,105.5	376.1	523.0	518.1	2,522.7

Table 39.—Number of growing-stock trees and rough and rotten trees on commercial forest land in Maryland, by diameter-class group, softwoods and hardwoods, and geographic unit, 1976
(In thousands of trees)

Diameter-class group (in inches)	Central	Southern	Lower Eastern Shore	Western	Total
GROWING-STOCK TREES					
Softwoods:					
5.0 - 8.9	23,377	11,389	24,087	6,571	65,424
9.0 - 18.9	7,358	4,518	15,345	1,635	28,856
19.0 and larger	47	40	193	—	280
Total	30,782	15,947	39,625	8,206	94,560
Hardwoods:					
5.0 - 10.9	70,481	22,070	41,189	32,550	166,290
11.0 - 18.9	28,107	7,973	8,089	7,795	51,964
19.0 and larger	4,429	1,009	732	494	6,664
Total	103,017	31,052	50,010	40,839	224,918
All species	133,799	46,999	89,635	49,045	319,478
Sampling error (in percent)	5	5	5	7	3
ROUGH AND ROTTEN TREES					
Softwoods:					
5.0 - 8.9	998	778	286	677	2,739
9.0 - 18.9	295	169	41	682	1,187
19.0 and larger	11	—	—	9	20
Total	1,304	947	327	1,368	3,946
Hardwoods:					
5.0 - 10.9	16,110	6,914	3,953	18,707	45,684
11.0 - 18.9	2,841	858	712	3,529	7,940
19.0 and larger	676	115	219	735	1,745
Total	19,627	7,887	4,884	22,971	55,369
All species	20,931	8,834	5,211	24,339	59,315
Sampling error (in percent)	9	8	10	9	5

Table 40.—Number of growing-stock trees on commercial forest land, in the Central Unit of Maryland, by species and diameter class, 1976
(In thousands of trees)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
White and red pine	4,190	2,302	1,477	353	—	—	48	—	10	—	—
Loblolly pine[a]	2,620	194	759	545	522	275	230	64	21	5	5
Virginia pine	22,744	10,398	7,455	3,241	1,111	376	125	38	—	—	—
Other yellow pines	764	258	145	39	129	138	31	24	—	—	—
Other softwoods	464	125	264	39	30	—	—	—	—	—	6
Total softwoods	30,782	13,277	10,100	4,217	1,792	789	434	126	31	5	11
Soft maples	9,489	4,302	2,547	1,158	495	350	281	149	86	121	—
Hard maples	154	—	51	80	-	—	—	12	11	—	—
Hickory	7,139	3,011	1,539	833	885	453	215	23	80	95	5
Beech	2,460	539	468	394	260	274	154	109	50	191	21
Sweetgum	7,438	2,777	2,203	723	848	382	291	114	11	81	8
Yellow-poplar	13,984	2,800	2,147	2,046	1,712	1,726	1,387	1,108	398	620	40
Blackgum	3,878	1,379	960	567	234	227	309	121	51	30	—
Ash-walnut-cherry	6,608	2,138	1,935	1,315	524	188	238	136	72	62	—
Select white oaks	11,733	3,502	2,033	2,053	1,450	1,003	695	401	213	341	42
Select red oaks	4,990	1,403	869	507	551	648	515	288	145	57	7
Other white oaks	10,158	3,331	2,732	1,317	1,198	662	277	332	181	113	15
Other red oaks	17,416	4,584	3,588	2,838	2,091	1,569	1,078	596	477	543	52
Black locust	1,826	290	619	395	313	135	33	25	10	6	—
Other hardwoods	5,744	2,478	1,200	830	369	314	262	97	70	111	13
Total hardwoods	103,017	32,534	22,891	15,056	10,930	7,931	5,735	3,511	1,855	2,371	203
All species	133,799	45,811	32,991	19,273	12,722	8,720	6,169	3,637	1,886	2,376	214

[a]Includes 522,000 pond pine and 44,000 shortleaf pine trees.

Table 41.—Number of growing-stock trees on commercial forest land, in the Southern Unit of Maryland, by species and diameter class, 1976

(In thousands of trees)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Loblolly pine[a]	4,108	1,352	1,209	539	502	315	147	30	5	9	—
Virginia pine	11,323	4,866	3,489	1,731	862	221	134	11	9	—	—
Other yellow pines	11	—	—	—	11	—	—	—	—	—	—
Other softwoods	505	334	139	15	—	—	—	—	—	12	5
Total softwoods	15,947	6,552	4,837	2,285	1,375	536	281	41	14	21	5
Soft maples	2,829	1,134	630	434	192	217	93	73	28	24	4
Hard maples	103	103	—	—	—	—	—	—	—	—	—
Hickory	1,081	198	283	178	214	55	72	34	27	16	4
Beech	1,800	541	319	335	188	162	67	80	62	42	4
Sweetgum	4,736	1,723	1,054	782	581	265	192	57	33	49	—
Yellow-poplar	4,915	1,472	1,116	715	731	289	194	180	100	102	16
Blackgum	1,170	301	421	209	134	28	30	35	5	7	—
Ash-walnut-cherry	1,597	533	235	421	178	122	80	28	—	—	—
Select white oaks	4,308	1,353	922	711	429	338	200	138	102	100	15
Select red oaks	377	45	35	97	48	47	37	35	14	19	—
Other white oaks	902	193	304	102	107	56	44	46	34	16	—
Other red oaks	4,771	1,646	981	556	642	397	244	162	63	76	4
Black locust	527	211	55	150	73	28	—	6	4	—	—
Other hardwoods	1,936	691	597	284	183	68	44	30	18	19	2
Total hardwoods	31,052	10,144	6,952	4,974	3,700	2,072	1,297	904	490	470	49
All species	46,999	16,696	11,789	7,259	5,075	2,608	1,578	945	504	491	54

[a]Includes 25,000 shortleaf pine trees.

Table 42.—Number of growing-stock trees on commercial forest land, in the Lower Eastern Shore Unit of Maryland, by species and diameter class, 1976

(In thousands of trees)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Loblolly pine[a]	38,503	13,811	9,426	6,599	4,205	2,715	1,209	368	134	36	—
Virginia pine	781	336	240	105	63	22	8	7	—	—	—
Other yellow pines	16	—	—	—	16	—	—	—	—	—	—
Other softwoods	325	198	76	—	—	12	16	—	15	8	—
Total softwoods	39,625	14,345	9,742	6,704	4,284	2,749	1,233	375	149	44	—
Soft maples	14,189	6,622	3,550	1,913	867	444	296	253	109	123	12
Hickory	364	166	30	116	43	—	9	—	—	—	—
Beech	881	388	66	82	141	56	52	28	33	35	—
Sweetgum	10,453	4,397	2,640	1,714	714	530	222	115	66	55	—
Yellow-poplar	221	62	55	—	—	31	42	13	—	14	4
Blackgum	4,096	1,699	920	740	274	218	148	39	28	28	2
Ash-walnut-cherry	1,035	659	228	38	29	44	26	7	—	4	—
Select white oaks	8,534	3,144	2,165	1,322	943	529	218	102	34	67	10
Select red oaks	173	—	53	72	33	10	—	—	—	5	—
Other white oaks	257	135	104	—	—	12	—	6	—	—	—
Other red oaks	7,125	2,498	1,916	1,170	727	426	182	109	21	68	8
Black locust	66	66	—	—	—	—	—	—	—	—	—
Other hardwoods	2,616	1,921	351	187	77	42	25	7	6	—	—
Total hardwoods	50,010	21,757	12,078	7,354	3,848	2,342	1,220	679	297	399	36
All species	89,635	36,102	21,820	14,058	8,132	5,091	2,453	1,054	446	443	36

[a]Includes 481,000 pond pine and 170,000 shortleaf pine trees.

Table 43.—Number of growing-stock trees on commercial forest land, in the Western Unit of Maryland, by species and diameter class, 1976

(In thousands of trees)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
White and red pine	2,042	1,188	569	246	—	25	—	14	—	—	—
Virginia pine	4,708	2,032	1,948	578	131	—	19	—	—	—	—
Other yellow pines	352	104	—	140	60	48	—	—	—	—	—
Other softwoods	1,104	456	274	224	105	26	19	—	—	—	—
Total softwoods	8,206	3,780	2,791	1,188	296	99	38	14	—	—	—
Soft maples	6,000	2,650	1,828	749	319	253	105	27	21	48	—
Hard maples	2,855	1,141	577	594	218	140	120	14	33	18	—
Hickory	1,443	550	216	396	150	69	18	27	—	17	—
Beech	610	480	—	101	29	—	—	—	—	—	—
Yellow-poplar	368	—	119	—	—	131	83	15	11	9	—
Blackgum	443	436	—	—	—	—	—	—	—	7	—
Ash-walnut-cherry	2,392	914	519	533	243	107	19	28	11	18	—
Select white oaks	7,534	3,332	1,719	1,334	538	266	189	113	11	32	—
Select red oaks	6,502	2,314	991	1,120	518	911	402	120	12	98	16
Other white oaks	5,227	1,287	1,733	1,021	522	405	188	30	—	41	—
Other red oaks	3,180	659	668	792	545	199	169	98	12	33	5
Black locust	1,452	718	420	263	35	16	—	—	—	—	—
Other hardwoods	2,833	983	887	506	247	109	32	28	33	8	—
Total hardwoods	40,839	15,464	9,677	7,409	3,364	2,606	1,325	500	144	329	21
All species	49,045	19,244	12,468	8,597	3,660	2,705	1,363	514	144	329	21

Table 44.—Net volume of timber on commercial forest land in Maryland, by class of timber and geographic unit, 1976

Geographic unit	Growing-stock trees			Rough trees	Rotten trees	All trees	Sampling errors
	Sawtimber	Poletimber	Total				
	Million cubic feet						*Percent*
Central	1,167.1	496.1	1,663.2	89.3	48.1	1,800.6	4
Southern	339.2	159.6	498.8	30.8	15.1	544.7	4
Lower Eastern Shore	559.6	305.8	865.4	17.4	15.5	898.3	4
Western	255.1	209.6	464.7	147.5	33.0	645.2	5
Total, all units	2,321.0	1,171.1	3,492.1	285.0	111.7	3,888.8	2

Table 45.—Net volume of growing stock and sawtimber on commercial forest land in Maryland, by ownership class and geographic unit, 1976

Geographic unit	Public	Forest industry	Farmer and other	Total	Sampling error
		Million cubic feet			*Percent*
Central	143.8	15.4	1,504.0	1,663.2	4
Southern	13.9	10.6	474.3	498.8	5
Lower Eastern Shore	50.9	147.2	667.3	865.4	4
Western	133.5	15.2	316.0	464.7	6
Total, all units	342.1	188.4	2,961.6	3,492.1	2
		Million board feet[a]			
Central	308.8	22.0	3,946.2	4,277.0	5
Southern	29.8	15.2	1,104.4	1,149.4	6
Lower Eastern Shore	115.1	309.3	1,545.7	1,970.1	5
Western	243.5	25.6	501.0	770.1	10
Total, all units	697.2	372.1	7,097.3	8,166.6	3

[a]International ¼-inch rule.

Table 46.—Net volume of growing stock and sawtimber on commercial forest land in Maryland, by stand-size class and geographic unit, 1976

Geographic unit	Sawtimber stands	Poletimber stands	Other stands	All stands
		Million cubic feet		
Central	1,298.7	323.3	41.2	1,663.2
Southern	375.1	91.9	31.8	498.8
Lower Eastern Shore	622.3	212.9	30.2	865.4
Western	261.8	170.7	32.2	464.7
Total, all units	2,557.9	798.8	135.4	3,492.1
		Million board feet[a]		
Central	3,839.1	345.4	92.5	4,277.0
Southern	981.3	122.8	45.3	1,149.4
Lower Eastern Shore	1,640.9	273.8	55.4	1,970.1
Western	586.3	165.6	18.2	770.1
Total, all units	7,047.6	907.6	211.4	8,166.6

[a]International ¼-inch rule.

Table 47.—Net volume of growing stock and sawtimber on commercial forest land in Maryland, by forest-type group and geographic unit, 1976

Forest-type group	Central	Southern	Lower Eastern Shore	Western	Total
			Million cubic feet		
White and red pine	26.6	—	—	16.4	43.0
Spruce/fir	—	—	—	4.8	4.8
Loblolly and shortleaf pine	205.7	126.5	474.4	23.2	829.8
Oak/pine	57.5	60.6	63.0	7.7	188.8
Oak/hickory	1,134.1	244.6	95.7	246.9	1,721.3
Oak/gum/cypress	45.2	24.5	78.3	—	148.0
Elm/ash/red maple	125.4	26.2	153.8	82.9	388.3
Maple/beech/birch	68.7	16.4	.2	82.8	168.1
Total, all groups	1,663.2	498.8	865.4	464.7	3,492.1
			Million board feet[a]		
White and red pine	10.6	—	—	14.3	24.9
Spruce/fir	—	—	—	9.5	9.5
Loblolly and shortleaf pine	389.3	240.7	1,058.0	32.4	1,720.4
Oak/pine	110.5	129.5	120.6	10.1	370.7
Oak/hickory	3,142.1	625.7	203.6	428.9	4,400.3
Oak/gum/cypress	88.6	58.0	204.7	—	351.3
Elm/ash/red maple	343.5	59.7	383.2	144.0	930.4
Maple/beech/birch	192.4	35.8	—	130.9	359.1
Total, all groups	4,277.0	1,149.4	1,970.1	770.1	8,166.6

[a]International ¼-inch rule.

Table 48.—Net volume of growing stock on commercial forest land in the Central Unit of Maryland, by species and diameter class, 1976
(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
White and red pine	29.2	11.9	11.1	4.2	—	—	1.5	—	.5	—	—
Loblolly pine[a]	40.6	.7	4.6	5.6	9.0	6.9	8.0	3.0	1.4	.7	.7
Virginia pine	137.4	29.1	42.7	32.3	17.5	9.4	4.6	1.8	—	—	—
Other yellow pines	10.0	.6	.7	.4	2.4	3.5	1.2	1.2	—	—	—
Other softwoods	3.5	.3	1.0	.2	.3	—	—	—	—	—	1.7
Total softwoods	220.7	42.6	60.1	42.7	29.2	19.8	15.3	6.0	1.9	.7	2.4
Soft maples	80.4	12.6	14.4	11.2	7.2	8.0	8.7	6.0	4.1	8.2	—
Hard maples	1.8	—	.4	.7	—	—	—	.4	.3	—	—
Hickory	77.6	9.4	9.5	8.8	15.7	11.9	7.6	1.3	5.0	7.8	.6
Beech	53.3	1.3	2.6	4.3	4.3	7.2	5.9	5.4	3.1	16.2	3.0
Sweetgum	76.5	8.1	12.5	7.4	15.3	9.8	10.3	5.3	.6	6.1	1.1
Yellow-poplar	271.2	9.5	13.1	21.6	28.2	40.2	43.0	45.2	20.6	43.1	6.7
Blackgum	46.6	3.7	5.7	6.2	3.8	5.7	10.6	5.6	2.9	2.4	—
Ash-walnut-cherry	66.8	6.7	10.8	13.7	8.6	4.3	8.0	6.0	3.9	4.8	—
Select white oaks	191.3	9.0	12.0	21.9	26.2	25.8	25.7	19.6	13.8	30.7	6.6
Select red oaks	85.2	3.8	5.4	5.6	9.4	16.5	17.5	13.3	8.3	4.4	1.0
Other white oaks	118.0	11.5	17.2	13.4	19.6	14.9	8.3	13.8	9.2	8.1	2.0
Other red oaks	285.9	14.2	21.8	32.5	36.7	39.7	38.1	27.9	27.1	40.3	7.6
Black locust	20.0	.9	3.6	3.7	5.3	3.1	1.1	1.2	.6	.5	—
Other hardwoods	67.9	6.9	7.3	8.5	7.1	8.5	8.9	4.8	3.8	9.7	2.4
Total hardwoods	1,442.5	97.6	136.3	159.5	187.4	195.6	193.7	155.8	103.3	182.3	31.0
All species	1,663.2	140.2	196.4	202.2	216.6	215.4	209.0	161.8	105.2	183.0	33.4

[a]Includes 4,300,000 cubic feet of pond pine and 1,000,000 of shortleaf pine.

Table 49.—Net volume of growing stock on commercial forest land in the Southern Unit of Maryland, by species and diameter class, 1976
(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Loblolly pine[a]	39.3	3.7	6.7	5.9	8.6	7.6	4.8	1.2	.2	.6	—
Virginia pine	73.9	11.7	19.5	17.6	14.2	5.4	4.4	.5	.6	—	—
Other yellow pines	.2	—	—	—	.2	—	—	—	—	—	—
Other softwoods	3.1	1.1	.7	.1	—	—	—	—	—	.7	.5
Total softwoods	116.5	16.5	26.9	23.6	23.0	13.0	9.2	1.7	.8	1.3	.5
Soft maples	28.2	3.2	3.4	4.0	2.9	5.0	2.9	3.0	1.5	1.8	.5
Hard maples	.4	.4	—	—	—	—	—	—	—	—	—
Hickory	16.8	.6	1.4	1.9	3.7	1.4	2.5	1.6	1.7	1.4	.6
Beech	26.0	1.4	1.7	2.9	3.0	3.6	2.4	3.5	3.5	3.5	.5
Sweetgum	50.0	5.4	5.9	7.9	9.6	6.5	6.3	2.6	1.8	4.0	—
Yellow-poplar	64.2	4.1	6.0	6.9	11.2	6.7	6.3	7.5	5.5	7.7	2.3
Blackgum	11.2	.8	2.3	2.0	2.1	.7	1.0	1.5	.3	.5	—
Ash-walnut-cherry	18.1	1.4	1.4	4.8	3.3	3.2	2.8	1.2	—	—	—
Select white oaks	62.0	3.7	4.9	7.1	7.1	8.6	7.2	6.3	6.2	8.5	2.4
Select red oaks	8.2	.1	.2	.9	.8	1.2	1.3	1.6	.8	1.3	—
Other white oaks	12.1	.5	1.5	1.1	1.5	1.3	1.4	1.8	1.7	1.3	—
Other red oaks	62.3	4.9	5.7	5.7	10.6	9.7	8.0	7.2	3.7	6.3	.5
Black locust	4.9	.5	.3	1.5	1.3	.7	—	.3	.3	—	—
Other hardwoods	17.9	2.0	3.1	2.7	3.0	1.6	1.4	1.3	1.1	1.4	.3
Total hardwoods	382.3	29.0	37.8	49.4	60.1	50.2	43.5	39.4	28.1	37.7	7.1
All species	498.8	45.5	64.7	73.0	83.1	63.2	52.7	41.1	28.9	39.0	7.6

[a]Includes 200,000 cubic feet of shortleaf pine.

Table 50.—Net volume of growing stock on commercial forest land in the Lower Eastern Shore Unit of Maryland, by species and diameter class, 1976
(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Loblolly pine[a]	403.0	32.1	56.4	77.2	81.9	76.8	48.4	19.0	8.4	2.8	—
Virginia pine	5.7	.7	1.4	1.2	1.1	.6	.3	.4	—	—	—
Other yellow pines	.3	—	—	—	.3	—	—	—	—	—	—
Other softwoods	3.4	.5	.4	—	—	.3	.7	—	.9	.6	—
Total softwoods	412.4	33.3	58.2	78.4	83.3	77.7	49.4	19.4	9.3	3.4	—
Soft maples	119.1	20.8	20.4	19.1	13.4	10.4	8.9	10.3	5.6	8.6	1.6
Hickory	2.8	.5	.2	1.1	.7	—	.3	—	—	—	—
Beech	12.9	1.2	.4	.9	2.2	1.3	1.7	1.1	1.7	2.4	—
Sweetgum	94.6	13.7	16.2	18.3	12.4	13.2	7.6	4.9	3.7	4.6	—
Yellow-poplar	4.7	.2	.4	—	—	.8	1.4	.6	—	.8	.5
Blackgum	39.2	5.4	5.7	7.8	4.8	5.0	5.0	1.7	1.5	2.0	.3
Ash-walnut-cherry	8.2	2.7	1.8	.6	.5	1.1	.9	.3	—	.3	—
Select white oaks	81.3	8.9	11.6	12.9	14.6	12.2	7.1	4.3	1.8	5.7	2.2
Select red oaks	2.2	—	.5	.6	.5	.3	—	—	—	.3	—
Other white oaks	1.5	.3	.6	—	—	.3	—	.3	—	—	—
Other red oaks	74.6	8.3	12.1	12.7	12.2	10.0	6.3	5.3	1.2	5.4	1.1
Black locust	.2	.2	—	—	—	—	—	—	—	—	—
Other hardwoods	11.7	4.9	1.7	1.6	1.1	1.0	.8	.3	.3	—	—
Total hardwoods	453.0	67.1	71.6	75.6	62.4	55.6	40.0	29.1	15.8	30.1	5.7
All species	865.4	100.4	129.8	154.0	145.7	133.3	89.4	48.5	25.1	33.5	5.7

[a]Includes 5,200,000 cubic feet of pond pine and 1,800,000 of shortleaf pine.

Table 51.—Net volume of growing stock on commercial forest land in the Western Unit of Maryland, by species and diameter class, 1976
(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
White and red pine	12.9	5.9	4.1	2.1	—	.4	—	.4	—	—	—
Virginia pine	19.8	3.4	8.7	5.3	1.8	—	.6	—	—	—	—
Other yellow pines	3.4	.3	—	1.2	.9	1.0	—	—	—	—	—
Other softwoods	7.3	1.4	1.4	2.2	1.5	.4	.4	—	—	—	—
Total softwoods	43.4	11.0	14.2	10.8	4.2	1.8	1.0	.4	—	—	—
Soft maples	52.9	8.7	11.3	8.9	5.8	7.0	3.9	1.5	1.4	4.4	—
Hard maples	31.3	4.8	3.8	6.8	4.0	3.6	4.4	.7	1.9	1.3	—
Hickory	17.6	1.9	1.5	5.0	3.1	2.1	.8	1.6	—	1.6	—
Beech	3.0	1.5	—	.9	.6	—	—	—	—	—	—
Yellow-poplar	10.4	—	1.0	—	—	3.7	3.4	.7	.8	.8	—
Blackgum	1.8	1.2	—	—	—	—	—	—	—	.6	—
Ash-walnut-cherry	24.1	2.5	3.3	5.9	4.8	3.3	.5	1.5	.8	1.5	—
Select white oaks	64.9	8.0	9.6	14.1	10.0	7.2	7.0	5.6	.7	2.7	—
Select red oaks	90.4	7.3	6.0	12.3	8.6	23.7	14.4	6.0	.6	9.0	2.5
Other white oaks	48.6	4.0	9.4	9.9	7.5	8.7	5.5	1.0	—	2.6	—
Other red oaks	45.3	2.3	4.4	9.6	9.2	5.3	5.9	4.6	.7	2.7	.6
Black locust	7.7	2.2	2.2	2.4	.5	.4	—	—	—	—	—
Other hardwoods	23.3	2.5	4.4	4.8	3.9	2.9	1.1	1.4	1.7	.6	—
Total hardwoods	421.3	46.9	56.9	80.6	58.0	67.9	46.9	24.6	8.6	27.8	3.1
All species	464.7	57.9	71.1	91.4	62.2	69.7	47.9	25.0	8.6	27.8	3.1

Table 52.—Net volume of sawtimber on commercial forest land in the Central Unit of Maryland, by species and diameter class, 1976
(In millions of board feet)[a]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
White and red pine	19.7	12.2	—	—	5.3	—	2.2	—	—
Loblolly pine[b]	120.6	16.2	29.9	24.0	29.3	10.9	4.7	2.8	2.8
Virginia pine	206.8	94.2	56.2	32.9	16.7	6.8	—	—	—
Other yellow pines	30.5	1.4	8.1	12.2	4.5	4.3	—	—	—
Other softwoods	8.9	.7	.9	—	—	—	—	—	7.3
Total softwoods	386.5	124.7	95.1	69.1	55.8	22.0	6.9	2.8	10.1
Soft maples	154.4	—	21.4	27.3	32.1	23.3	16.1	34.2	—
Hard maples	2.6	—	—	—	—	1.4	1.2	—	—
Hickory	177.4	—	47.2	41.6	28.8	5.1	20.0	32.1	2.6
Beech	174.7	—	13.1	25.7	22.0	20.9	12.2	67.8	13.0
Sweetgum	173.2	—	46.1	34.9	39.1	20.6	2.3	25.6	4.6
Yellow-poplar	859.9	—	85.2	141.1	162.6	178.4	83.0	181.0	28.6
Blackgum	113.1	—	11.3	19.2	39.4	22.2	11.7	9.3	—
Ash-walnut-cherry	128.8	—	25.5	14.7	29.5	23.5	15.4	20.2	—
Select white oaks	555.3	—	79.8	90.0	96.0	76.9	55.1	129.5	28.0
Select red oaks	258.2	—	28.6	56.6	65.3	51.7	33.0	18.5	4.5
Other white oaks	272.6	—	57.8	51.5	31.0	53.7	36.2	33.9	8.5
Other red oaks	811.7	—	111.2	139.5	143.0	109.6	107.3	168.7	32.4
Black locust	39.5	—	15.7	10.4	4.1	4.7	2.3	2.3	—
Other hardwoods	169.1	—	21.4	29.2	32.8	19.1	15.3	41.0	10.3
Total hardwoods	3,890.5	—	564.3	681.7	725.7	611.1	411.1	764.1	132.5
All species	4,277.0	124.7	659.4	750.8	781.5	633.1	418.0	766.9	142.6

[a]International ¼-inch rule.
[b]Includes 7,600,000 board feet of pond pine and 3,200,000 of shortleaf pine.

Table 53.—Net volume of sawtimber on commercial forest land in the Southern Unit of Maryland, by species and diameter class, 1976

(In millions of board feet)[a]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Loblolly pine	97.3	17.0	27.7	26.9	17.6	4.7	.9	2.5	—
Virginia pine	134.1	49.9	45.8	19.0	15.8	1.7	1.9	—	—
Other yellow pines	.6	—	.6	—	—	—	—	—	—
Other softwoods	5.3	.4	—	—	—	—	—	2.8	2.1
Total softwoods	237.3	67.3	74.1	45.9	33.4	6.4	2.8	5.3	2.1
Soft maples	59.0	—	8.1	15.3	10.0	11.2	5.6	6.7	2.1
Hickory	44.3	—	10.8	4.8	8.9	5.7	6.6	5.3	2.2
Beech	69.6	—	8.4	11.9	8.3	12.8	12.5	13.6	2.1
Sweetgum	102.6	—	26.9	21.3	22.0	9.8	6.8	15.8	—
Yellow-poplar	163.8	—	31.3	22.2	22.2	28.0	20.4	30.4	9.3
Blackgum	20.5	—	6.0	2.1	3.5	5.7	1.1	2.1	—
Ash-walnut-cherry	33.7	—	9.3	10.2	9.8	4.4	—	—	—
Select white oaks	163.9	—	20.6	28.5	25.2	23.2	23.4	33.6	9.4
Select red oaks	24.3	—	2.3	3.8	4.1	5.9	3.1	5.1	—
Other white oaks	31.6	—	4.2	4.3	5.0	6.3	6.5	5.3	—
Other red oaks	157.5	—	30.3	31.6	28.2	26.7	13.9	24.7	2.1
Black locust	7.8	—	3.6	2.3	—	.9	1.0	—	—
Other hardwoods	33.5	—	8.4	4.9	4.8	4.7	4.5	5.2	1.0
Total hardwoods	912.1	—	170.2	163.2	152.0	145.3	105.4	147.8	28.2
All species	1,149.4	67.3	244.3	209.1	185.4	151.7	108.2	153.1	30.3

[a]International ¼-inch rule.

Table 54.—Net volume of sawtimber on commercial forest land in the Lower Eastern Shore Unit of Maryland, by species and diameter class, 1976

(In millions of board feet)[a]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Loblolly pine[b]	1,021.0	223.0	256.2	258.6	171.2	69.5	31.8	10.7	—
Virginia pine	11.6	3.6	3.5	2.1	1.2	1.2	—	—	—
Other yellow pines	.9	—	.9	—	—	—	—	—	—
Other softwoods	9.0	—	—	.9	2.3	—	3.6	2.2	—
Total softwoods	1,042.5	226.6	260.6	261.6	174.7	70.7	35.4	12.9	—
Soft maples	230.7	—	44.2	38.7	35.3	42.8	23.3	39.2	7.2
Hickory	3.6	—	2.4	—	1.2	—	—	—	—
Beech	41.8	—	7.3	4.8	7.0	4.7	7.5	10.5	—
Sweetgum	179.0	—	41.1	50.3	30.6	20.5	15.7	20.8	—
Yellow-poplar	17.3	—	—	2.9	5.7	2.5	—	3.8	2.4
Blackgum	78.1	—	15.7	18.8	20.0	7.1	6.2	9.1	1.2
Ash-walnut-cherry	12.2	—	1.8	4.0	3.7	1.3	—	1.4	—
Select white oaks	185.7	—	47.9	46.6	28.9	18.0	7.8	26.9	9.6
Select red oaks	4.1	—	1.7	1.1	—	—	—	1.3	—
Other white oaks	2.4	—	—	1.0	—	1.4	—	—	—
Other red oaks	159.8	—	40.4	37.5	24.9	22.0	5.0	24.6	5.4
Other hardwoods	12.9	—	3.5	3.5	3.5	1.2	1.2	—	—
Total hardwoods	927.6	—	206.0	209.2	160.8	121.5	66.7	137.6	25.8
All species	1,970.1	226.6	466.6	470.8	335.5	192.2	102.1	150.5	25.8

[a]International ¼-inch rule.
[b]Includes 12,800,000 board feet of pond pine and 3,600,000 of shortleaf pine.

Table 55.—Net volume of sawtimber on commercial forest land in the Western Unit of Maryland, by species and diameter class, 1976
(In millions of board feet)[a]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
White and red pine	9.4	6.4	—	1.2	—	1.8	—	—	—
Virginia pine	25.6	17.1	6.2	—	2.3	—	—	—	—
Other yellow pines	10.3	3.7	2.9	3.7	—	—	—	—	—
Other softwoods	14.8	6.8	5.1	1.3	1.6	—	—	—	—
Total softwoods	60.1	34.0	14.2	6.2	3.9	1.8	—	—	—
Soft maples	71.2	—	16.7	21.0	12.0	4.3	4.5	12.7	—
Hard maples	47.9	—	11.4	10.9	13.3	2.3	5.9	4.1	—
Hickory	28.1	—	8.7	6.7	2.6	5.3	—	4.8	—
Beech	1.7	—	1.7	—	—	—	—	—	—
Yellow-poplar	29.0	—	—	11.1	10.7	2.1	2.3	2.8	—
Blackgum	1.5	—	—	—	—	—	—	1.5	—
Ash-walnut-cherry	36.3	—	13.3	9.7	1.6	4.5	2.5	4.7	—
Select white oaks	100.5	—	29.2	21.9	21.3	17.2	2.2	8.7	—
Select red oaks	194.4	—	24.2	70.1	44.6	18.2	1.8	28.0	7.5
Other white oaks	74.9	—	21.2	25.8	16.8	3.0	—	8.1	—
Other red oaks	87.0	—	26.2	16.2	18.3	14.1	2.2	7.9	2.1
Black locust	2.5	—	1.2	1.3	—	—	—	—	—
Other hardwoods	35.0	—	11.0	8.7	3.4	4.5	5.3	2.1	—
Total hardwoods	710.0	—	164.8	203.4	144.6	75.5	26.7	85.4	9.6
All species	770.1	34.0	179.0	209.6	148.5	77.3	26.7	85.4	9.6

[a]International ¼-inch rule.

Table 56.—Net volume of sawtimber on commercial forest land in the Central Unit of Maryland, by species and quality class, 1976

(In millions of board feet)[a]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[b]
Softwoods:					
White pine	19.7	1.5	2.5	11.3	4.4
Loblolly pine[c]	120.6	43.0	8.2	69.4	—
Virginia pine	206.8	6.5	7.6	192.7	—
Other yellow pines	30.5	—	2.7	27.8	—
Other softwoods[d]	8.9	—	—	—	—
Total softwoods	386.5	51.0	21.0	301.2	4.4
Hardwoods:					
Soft maples	154.4	3.6	17.5	102.3	31.0
Hard maples	2.6	1.7	.5	.3	.1
Hickory	177.4	17.8	41.1	81.9	36.6
Beech	174.7	9.2	9.7	83.7	72.1
Sweetgum	173.2	23.1	25.3	72.6	52.2
Yellow-poplar	859.9	161.3	185.5	346.3	166.8
Blackgum	113.1	22.3	27.8	51.0	12.0
Ash-walnut-cherry	128.8	16.2	37.1	58.7	16.8
Select white oaks	555.3	73.6	125.2	223.9	132.6
Select red oaks	258.2	41.0	80.6	111.0	25.6
Other white oaks	272.6	38.9	68.5	123.1	42.1
Other red oaks	811.7	118.1	183.3	309.4	200.9
Black locust	39.5	1.4	3.5	27.2	7.4
Other hardwoods	169.1	21.4	40.9	87.8	19.0
Total hardwoods	3,890.5	549.6	846.5	1,679.2	815.2
			(In percent)		
Hardwood quality	100	14	22	43	21

[a]International ¼-inch rule.

[b]Grade 4 applies only to white pine. For hardwoods the volumes in this column are for construction logs.

[c]This includes 7.6 million board feet of pond pine and 3.2 million board feet of shortleaf pine.

[d]Softwood species other than pine are not graded into standard-lumber grades.

Table 57.—Net volume of sawtimber on commercial forest land in the Southern Unit of Maryland, by species and quality class, 1976

(In millions of board feet)[a]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[b]
Softwoods:					
Loblolly pine	97.3	21.1	12.5	63.7	—
Virginia pine	134.1	1.3	4.3	128.5	—
Other yellow pines	.6	—	—	.6	—
Other softwoods[c]	5.3	—	—	—	—
Total softwoods	237.3	22.4	16.8	192.8	—
Hardwoods:					
Soft maples	59.0	3.4	11.7	35.4	8.5
Hickory	44.3	2.4	11.7	20.2	10.0
Beech	69.6	.2	.7	39.4	29.3
Sweetgum	102.6	9.4	19.5	41.8	31.9
Yellow-poplar	163.8	19.9	36.3	67.5	40.1
Blackgum	20.5	3.8	2.5	11.3	2.9
Ash-walnut-cherry	33.7	3.0	13.4	12.9	4.4
Select white oaks	163.9	19.4	37.3	68.6	38.6
Select red oaks	24.3	2.5	6.7	11.6	3.5
Other white oaks	31.6	4.7	6.2	13.0	7.7
Other red oaks	157.5	11.5	33.2	69.2	43.6
Black locust	7.8	.5	.9	5.5	.9
Other hardwoods	33.5	5.0	8.3	16.9	3.3
Total hardwoods	912.1	85.7	188.4	413.3	224.7
			(In percent)		
Hardwood quality	100	9	21	45	25

[a]International ¼-inch rule.
[b]Hardwood volumes in this column are for construction logs.
[c]Softwood species other than pine are not graded into standard-lumber grades.

Table 58.—Net volume of sawtimber on commercial forest land in the Lower Eastern Shore Unit of Maryland, by species and quality class, 1976

(In millions of board feet)[a]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[b]
Softwoods:					
Loblolly pine[c]	1,021.0	288.2	155.7	577.1	—
Virginia pine	11.6	—	.6	11.0	—
Other yellow pines	.9	—	.4	.5	—
Other softwoods[d]	9.0	—	—	—	—
Total softwoods	1,042.5	288.2	156.7	588.6	—
Hardwoods:					
Soft maples	230.7	19.4	25.4	139.2	46.7
Hickory	3.6	—	.4	1.9	1.3
Beech	41.8	.3	1.5	22.3	17.7
Sweetgum	179.0	31.5	26.7	68.9	51.9
Yellow-poplar	17.3	5.7	4.3	5.1	2.2
Blackgum	78.1	14.3	17.4	39.3	7.1
Ash-walnut-cherry	12.2	4.5	2.7	4.0	1.0
Select white oaks	185.7	30.3	30.5	76.9	48.0
Select red oaks	4.1	—	.8	2.9	.4
Other white oaks	2.4	—	.7	1.4	.3
Other red oaks	159.8	21.0	31.2	66.1	41.5
Other hardwoods	12.9	2.3	3.2	6.0	1.4
Total hardwoods	927.6	129.3	144.8	434.0	219.5
		(In percent)			
Hardwood quality	100	14	16	46	24

[a]International ¼-inch rule.
[b]Hardwood volumes in this column are for construction logs.
[c]This includes 12.8 million board feet of pond pine and 3.6 million board feet of shortleaf pine.
[d]Softwood species other than pine are not graded into standard-lumber grades.

Table 59.—Net volume of sawtimber on commercial forest land in the Western Unit of Maryland, by species and quality class, 1976

(In millions of board feet)[a]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[b]
Softwoods:					
White and red pine	9.4	—	0.9	7.7[c]	0.8
Virginia pine	25.6	—	—	25.6	—
Other yellow pines	10.3	—	1.7	8.6	—
Other softwoods[d]	14.8	—	—	—	—
Total softwoods	60.1	—	2.6	41.9	.8
Hardwoods:					
Soft maples	71.2	4.0	6.4	32.1	28.7
Hard maples	47.9	3.4	6.0	19.0	19.5
Hickory	28.1	1.2	8.3	7.4	11.2
Beech	1.7	—	—	1.5	.2
Yellow-poplar	29.0	—	1.3	6.5	21.2
Blackgum	1.5	1.0	.3	.2	—
Ash-walnut-cherry	36.3	2.8	4.4	18.5	10.6
Select white oaks	100.5	4.0	9.5	40.4	46.6
Select red oaks	194.4	13.9	42.6	96.8	41.1
Other white oaks	74.9	1.2	9.2	26.6	37.9
Other red oaks	87.0	7.0	11.3	18.8	49.9
Black locust	2.5	—	—	—	2.5
Other hardwoods	35.0	3.2	3.7	16.5	11.6
Total hardwoods	710.0	41.7	103.0	284.3	281.0
			(In percent)		
Hardwood quality	100	6	14	40	40

[a]International ¼-inch rule.
[b]Grade 4 applies only to white pine. For hardwoods the volumes in this column are for construction logs.
[c]This includes 5.2 million board feet of red pine.
[d]Softwood species other than pine are not graded into standard-lumber grades.

Table 60.—Annual net growth and removals of growing stock and sawtimber in Maryland, by species group and geographic unit, 1975[a]

Geographic unit	Softwoods		Hardwoods		Total	
	Growth	Removals	Growth	Removals	Growth	Removals
	Thousand cubic feet					
Central	1,129	2,622	48,991	26,749	50,120	29,371
Southern	4,833	2,660	12,182	12,460	17,015	15,120
Lower Eastern Shore	18,716	17,580	13,850	5,843	32,566	23,423
Western	222	738	11,077	16,748	11,299	17,486
Total, all units	24,900	23,600	86,100	61,800	111,000	85,400
	Thousand board feet[b]					
Central	7,283	7,424	152,507	67,249	159,790	74,673
Southern	11,357	8,876	28,740	33,358	40,097	42,234
Lower Eastern Shore	55,227	49,232	26,856	15,211	82,083	64,443
Western	1,133	2,468	14,897	37,182	16,030	39,650
Total, all units	75,000	68,000	223,000	153,000	298,000	221,000

[a]Based on trends of growth and removals for the period between inventories as estimated from remeasured plots.
[b]International 1/4-inch rule.

Table 61.—Land area of Maryland, by land class and county, 1976

County	Total land area[a]	Nonforest land area	Forest-land area			
			Noncommercial[b]	Commercial		Sampling error[c]
	Thousand acres	*Thousand acres*	*Thousand acres*	*Thousand acres*	*Percent*[d]	*Percent*
Anne Arundel	270.7	150.6	5.2	114.9	42	10
Baltimore[e]	432.7	308.3	10.9	113.5	26	12
Caroline	205.4	133.6	1.0	70.8	34	13
Carroll	291.9	227.2	1.9	62.8	22	21
Cecil	231.7	152.5	3.7	75.5	33	17
Frederick	425.6	294.9	12.8	117.9	28	12
Harford	289.9	182.3	21.6	86.0	30	16
Howard	160.6	107.0	6.0	47.6	30	16
Kent	179.8	135.2	1.1	43.5	24	19
Montgomery	316.8	229.4	16.6	70.8	22	18
Prince Georges	309.8	176.2	23.0	110.6	36	10
Queen Annes	240.0	182.5	1.3	56.2	23	20
Talbot	167.0	126.6	0.4	40.0	24	23
Washington	293.8	190.2	8.2	95.4	32	13
Central Unit	3,815.7	2,596.5	113.7	1,105.5	29	3.4
Calvert	138.9	62.5	1.8	74.6	54	6
Charles	293.7	113.6	1.3	178.8	61	4
St. Marys	238.7	113.5	2.5	122.7	51	5
Southern Unit	671.3	289.6	5.6	376.1	56	2.8
Dorchester	380.2	227.5	2.0	150.7	40	5
Somerset	217.0	118.1	0.1	98.8	46	6
Wicomico	243.8	129.9	[f]	113.9	47	4
Worcester	306.5	145.9	1.0	159.6	52	4
Lower Eastern Shore	1,147.5	621.4	3.1	523.0	46	2.2
Allegany	273.9	60.6	5.7	207.6	76	4
Garrett	421.8	108.9	2.4	310.5	74	3
Western Unit	695.7	169.5	8.1	518.1	74	2.3
State	6,330.2	3,677.0	130.5	2,522.7	40	1.7

[a]Source: U.S. Bureau of the Census, U.S. Census of Population: 1970, Vol. I.
[b]Includes productive-reserved, urban, and unproductive forest land.
[c]In percent for commercial forest land, at the 68-percent probability level.
[d]Commercial forest land as a percent of total land area.
[e]Includes Baltimore City.
[f]Fewer than 50 acres.

Table 62.—Net volume of growing stock on commercial forest land in Maryland, by county and species group, 1976[a]

County	Softwoods	Hardwoods	Total	Sampling error of total
	Million cubic feet			*Percent*
Anne Arundel	29.0	150.5	179.5	12
Baltimore	17.2	151.0	168.2	12
Caroline	32.0	72.4	104.4	15
Carroll	4.4	87.2	91.6	15
Cecil	12.8	100.2	113.0	16
Frederick	7.7	171.1	178.8	11
Harford	19.8	113.0	132.8	15
Howard	5.7	63.8	69.5	15
Kent	7.1	57.4	64.5	18
Montgomery	5.0	99.5	104.5	14
Prince Georges	30.7	144.1	174.8	12
Queen Annes	8.1	75.6	83.7	17
Talbot	21.4	38.4	59.8	21
Washington	19.8	118.3	138.1	13
Central Unit	220.7	1,442.5	1,663.2	3.8
Calvert	19.3	79.0	98.3	10
Charles	54.3	177.5	231.8	7
St. Marys	42.9	125.8	168.7	8
Southern Unit	116.5	382.3	498.8	4.5
Dorchester	105.0	122.5	227.5	8
Somerset	88.2	80.6	168.8	10
Wicomico	93.0	107.2	200.2	8
Worcester	126.2	142.7	268.9	7
Lower Eastern Shore Unit	412.4	453.0	865.4	3.6
Allegany	28.9	159.6	188.5	10
Garrett	14.5	261.7	276.2	8
Western Unit	43.4	421.3	464.7	6.2
State	793.0	2,699.1	3,492.1	2.3

[a]Direct comparisons of these county estimates with those published in previous reports is not recommended. If comparisons are desired, contact the Resources Evaluation Unit for assistance.

Table 63.—Net volume of sawtimber on commercial forest land in Maryland, by county and species group, 1976[a]

County	Softwoods	Hardwoods	Total	Sampling error of total
		Million board feet[b]		*Percent*
Anne Arundel	33.9	406.9	440.8	16
Baltimore	24.4	412.3	436.7	16
Caroline	96.2	169.5	265.7	20
Carroll	8.2	238.5	246.7	20
Cecil	17.8	273.6	291.4	21
Frederick	15.0	470.7	485.7	14
Harford	25.6	309.8	335.4	18
Howard	8.5	173.1	181.6	20
Kent	9.6	160.4	170.0	24
Montgomery	9.0	273.5	282.5	19
Prince Georges	39.9	384.2	424.1	15
Queen Annes	10.2	212.1	222.3	22
Talbot	60.8	85.9	146.7	27
Washington	27.4	320.0	347.4	17
Central Unit	386.5	3,890.5	4,277.0	4.9
Calvert	39.9	189.5	229.4	14
Charles	109.8	418.6	528.4	10
St. Marys	87.6	304.0	391.6	11
Southern Unit	237.3	912.1	1,149.4	5.5
Dorchester	256.9	247.9	504.8	12
Somerset	226.0	158.4	384.4	14
Wicomico	240.7	225.0	465.7	12
Worcester	318.9	296.3	615.2	10
Lower Eastern Shore Unit	1,042.5	927.6	1,970.1	5.0
Allegany	37.6	267.1	304.7	16
Garrett	22.5	442.9	456.4	14
Western Unit	60.1	710.0	770.1	10.2
State	1,726.4	6,440.2	8,166.6	3.1

[a]Direct comparisons of these county estimates with those published in previous reports is not recommended. If comparisons are desired, contact the Resources Evaluation Unit for assistance.
[b]International ¼-inch rule.

Metric Equivalents of Units Used in This Report

1 acre = 4,046.86 square meters or 0.404686 hectares
1,000 acres = 404.686 hectares
1,000,000 acres = 404,686 hectares
1,000 board feet = 3.48 cubic meters[a]
1 cubic foot = 0.028317 cubic meters
1,000 cubic feet = 28.317 cubic meters
1,000,000 cubic feet = 28,317 cubic meters
1 cord (wood, bark, and airspace) = 3.6246 cubic meters
1 cord (solid wood, pulpwood) = 2.4069 cubic meters
1 cord (solid wood, other than pulpwood) = 2.2654 cubic meters
1,000 cords (pulpwood) = 2,406.9 cubic meters
1,000 cords (other products) = 2,265.4 cubic meters
1 inch = 2.54 centimeters or 0.0254 meters
1 foot = 30.48 centimeters or 0.3048 meters
Breast height = 1.4 meters above ground level
1 mile = 1.609 kilometers
1 square foot = 929.03 square centimeters or 0.0929 square meters
1 square foot per acre basal area = 0.229568 square meters per hectare
1 cubic foot per acre = 0.069973 cubic meters per hectare

[a]While 1,000 board feet is theoretically equivalent to 2.36 cubic meters, this is true only when a board foot is actually a piece of wood with a volume 1/12 of a cubic foot. The International ¼-inch log rule is used by the Forest Service in the East to estimate the product potential in board feet. The reliability of the estimate, using a conversion, will vary with the size of the log measure. The conversion given here, 3.48 cubic meters, is based on the cubic volume of a log 16 feet long and 15 inches in diameter inside bark (dib) at the small end. This conversion could be used for average comparisons when accuracy of ±10 percent is acceptable. Since the board foot unit is not a true measure of wood volume and since products other than dimension lumber are becoming important, this unit may eventually be phased out and replaced with the cubic meter unit.

U.S. GOVERNMENT PRINTING OFFICE: 1979—603-111/51

Powell, Douglas S., and Neal P. Kingsley.
1980. **The forest resources of Maryland.** Northeast. For. Exp. Stn., Broomall, Pa.
103 p., illus. (USDA For. Serv. Resour. Bull. NE-61)

A statistical and analytical report on the third forest survey of Maryland conducted in 1975 and 1976. Statistical findings are based on data from remeasured 1/5-acre plots and both remeasured and new 10-point variable-radius plots. The present status and trends in forest-land area, timber volume, and annual growth and removals are discussed. Timber products output by forest industries, based on a canvass of industries in 1975, and the importance of timber to the economy of Maryland also are discussed. The report includes a discussion of the outlook for timber supplies through 2006, and forest-management opportunities in the state. The status and importance of the nontimber forest resources of Maryland are also discussed.

(752):905.2

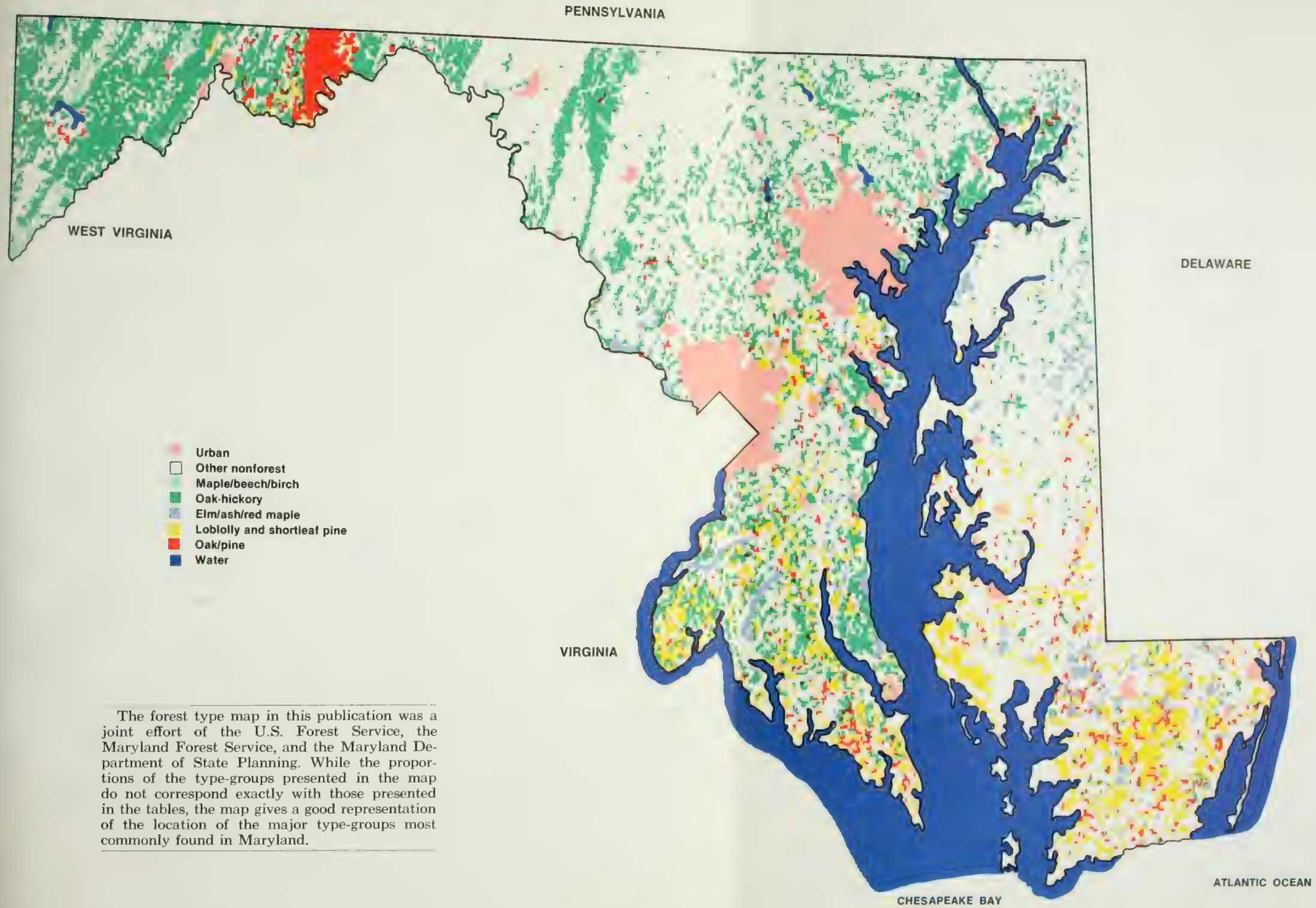
Keywords: Forest survey, trends, area, volume, growth, removals

Powell, Douglas S., and Neal P. Kingsley.
1980. **The forest resources of Maryland.** Northeast. For. Exp. Stn., Broomall, Pa.
103 p., illus. (USDA For. Serv. Resour. Bull. NE-61)

A statistical and analytical report on the third forest survey of Maryland conducted in 1975 and 1976. Statistical findings are based on data from remeasured 1/5-acre plots and both remeasured and new 10-point variable-radius plots. The present status and trends in forest-land area, timber volume, and annual growth and removals are discussed. Timber products output by forest industries, based on a canvass of industries in 1975, and the importance of timber to the economy of Maryland also are discussed. The report includes a discussion of the outlook for timber supplies through 2006, and forest-management opportunities in the state. The status and importance of the nontimber forest resources of Maryland are also discussed.

(752):905.2

Keywords: Forest survey, trends, area, volume, growth, removals



The forest type map in this publication was a joint effort of the U.S. Forest Service, the Maryland Forest Service, and the Maryland Department of State Planning. While the proportions of the type-groups presented in the map do not correspond exactly with those presented in the tables, the map gives a good representation of the location of the major type-groups most commonly found in Maryland.

Headquarters of the Northeastern Forest Experiment Station are in Broomall, Pa. Field laboratories and research units are maintained at:

- Amherst, Massachusetts, in cooperation with the University of Massachusetts.
- Beltsville, Maryland.
- Berea, Kentucky, in cooperation with Berea College.
- Burlington, Vermont, in cooperation with the University of Vermont.
- Delaware, Ohio.
- Durham, New Hampshire, in cooperation with the University of New Hampshire.
- Hamden, Connecticut, in cooperation with Yale University.
- Kingston, Pennsylvania.
- Morgantown, West Virginia, in cooperation with West Virginia University, Morgantown.
- Orono, Maine, in cooperation with the University of Maine, Orono.
- Parsons, West Virginia.
- Princeton, West Virginia.
- Syracuse, New York, in cooperation with the State University of New York College of Environmental Sciences and Forestry at Syracuse University, Syracuse.
- University Park, Pennsylvania, in cooperation with the Pennsylvania State University.
- Warren, Pennsylvania.

GOVT. DOCUMENTS
DEPOSITORY ITEM

JUN 10 1980

CLEMSON
LIBRARY

ODC:861.0(74):721:792

NORTHEASTERN PULPWOOD, 1978: an Annual Assessment of Regional Timber Output

CLEMSON UNIVERSITY LIBRARY
JUN 11 1980
SCI., TECH. & AGR. DIV.

by Robert L. Nevel, Jr.
and James T. Bones

FOREST SERVICE RESOURCE BULLETIN NE-62
1980

FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE
NORTHEASTERN FOREST EXPERIMENT STATION
370 REED ROAD, BROOMALL, PA 19008

The Authors

ROBERT L. NEVEL, JR., forester, received a B.S. degree in forest technology from the Pennsylvania State University in 1965 and an M.F. degree in wood technology from Yale University in 1968. He joined the Northeastern Forest Experiment Station's Forestry Sciences Laboratory, Princeton, West Virginia, in 1968, where he was engaged in research on the economic efficiency of hardwood resources use in secondary manufactured products. In June 1978, he joined the Northeastern Station at Broomall, Pennsylvania, where he is working in the timber-removals phase of Forest Resources Evaluation.

JAMES T. BONES is a research forester in the Resources Evaluation unit at the Northeastern Forest Experiment Station, Broomall, Pa. He is Group Leader of the timber removals and industry analysis branch, specializing in timber utilization and primary timber industry trend analysis. He received a B.S. degree in 1952 and M.S. degree in 1956 from Utah State University. In 1978 he completed a year of postgraduate studies at Pennsylvania State University. Before transferring to the Northeastern Forest Experiment Station in 1968, he worked at the Pacific Northwest Forest and Range Experiment station and the Institute of Northern Forestry, and was a United Nations forestry advisor to the Government of Colombia in South America.

MANUSCRIPT RECEIVED FOR PUBLICATION 17 DECEMBER 1979

Cover Photo

This chipping system, operating near Waitsfield, Vermont, illustrates how a recent development in harvesting technology has led to the acceptance of whole-tree chips as furnish. Initially, mill managers resisted the use of whole-tree chips because of the amount of bark and other foreign material that was introduced into the pulping system. By adding a baffle to the outfeed mechanism of the whole-tree chipping system, much of the bark and other undesirable material is deflected. (Photo courtesy of Bill Gove, Vermont Department of Forests, Parks, and Recreation)

Abstract

This annual assessment of regional timber output is based on a canvass of the pulpmills in the Northeast that use roundwood or wood residue as a basic raw material for paper, insulation, and hardboard products. The report includes a discussion and tabular data on roundwood and chips from plant residues produced in and received by the 14 northeastern states in 1978: pulpwood production by state, county, and selected species; pulpwood receipts from roundwood by state and selected species; pulpwood chip receipts by state and selected species; and production of total-tree chips. From 1977 to 1978, pulpwood production increased by 3 percent; roundwood production rose by 7 percent; and chipped residue production declined by 8 percent. Current record levels are discussed and trends in pulpwood production for the past 16 years are illustrated. A list of the woodpulp mills that received northeastern pulpwood during 1978 is included.

Contents

Introduction 1
Pulpwood Production Rises by 3 Percent 2
Production from Roundwood up by 7 Percent . . . 3
Eighteen Counties Top 50-Thousand-Cord Mark . . 4
Total-Tree Utilization 4
Roundwood Harvest Related to Growing-Stock Inventory 5
Wood Chip Production Declines by 8 Percent 6
Appendix 6
Index to Tables 12

INTRODUCTION

THIS REPORT IS BASED on a canvass of pulpmills in the Northeast that use wood —whether roundwood or plant residues—as a basic raw material. Cross-boundary shipments are traced by exchanging information with neighboring experiment stations that conduct similar canvasses. Mills that use pulpwood as a raw material in producing insulation board and hardboard were included in the canvass.

The statistics for production from roundwood are based on mill receipts, which are subject to fluctuations caused by uneven wood-inventory buildups or liquidations from year to year. The plant residues are received at the pulpmill mostly in chip form. Origins of mill receipts of pulpwood from roundwood are reported by county where harvested. However, pulpwood from plant residue can be traced only to the state where it was produced. Some of the logs from which the residue came probably were harvested in states other than the one in which they were processed.

The 76.2 million cords of pulpwood produced domestically in 1978 brought United States production to within 20,000 cords of the lofty prerecession level recorded in 1974. But most economists agree that we are now in—or at the beginning of—another economic slowdown which will adversely affect national demand for woodpulp and pulpwood output. In the Northeast, because our market share is relatively small and our products diverse, it seems that we are less affected by economic aberrations. Our slow continuous growth rate can be traced to incremental expansion and replacement of existing plants rather than the new plant construction that has proliferated in the South.

An original reason for locating the woodpulp industry in the Northeast was that the region had an ample timber supply. Over the years, the supply situation has improved so that more growing stock is physically present today than at any time in the past half century. The Northeast, however, has become home to many Americans, and nagging problems must be solved relating to owners of small woodlots, timber availability, and the extent to which the owner will harvest the timber as a crop. Even those who do not own timber land have made their wishes known. Several years ago, concerns for the preservation of New England's picturesque environment led voters there to reject the proposed construction of a pulpmill.

For those pulpwood industry planners who have successfully identified and adjusted for the Northeast's current economic and political uncertainties, there is a third challenge to be met and overcome—raw material allocation. Traditional markets favor channeling timber into its most profitable use—historically, solid wood products. This has been accomplished in recent years by adding primary manufacturing plants to existing woodpulp facilities, or by providing for timber breakdown and distribution at an intermediate point. As these practices grew, the round pulpwood deficit was offset by chipped byproducts from these and neighboring processing plants. High energy costs, however, have upset current distribution channels for raw material. Industrial fuel and power generation is an alternative market for today's waste material. The raw material supplier has been quick to identify the advantages of selling to this new market: a greater portion of his total manufacturing residue is acceptable; and while uniform moisture content and size of the material are often critical, the amount of bark and other contaminants is not. Whole-tree chipping operations, which

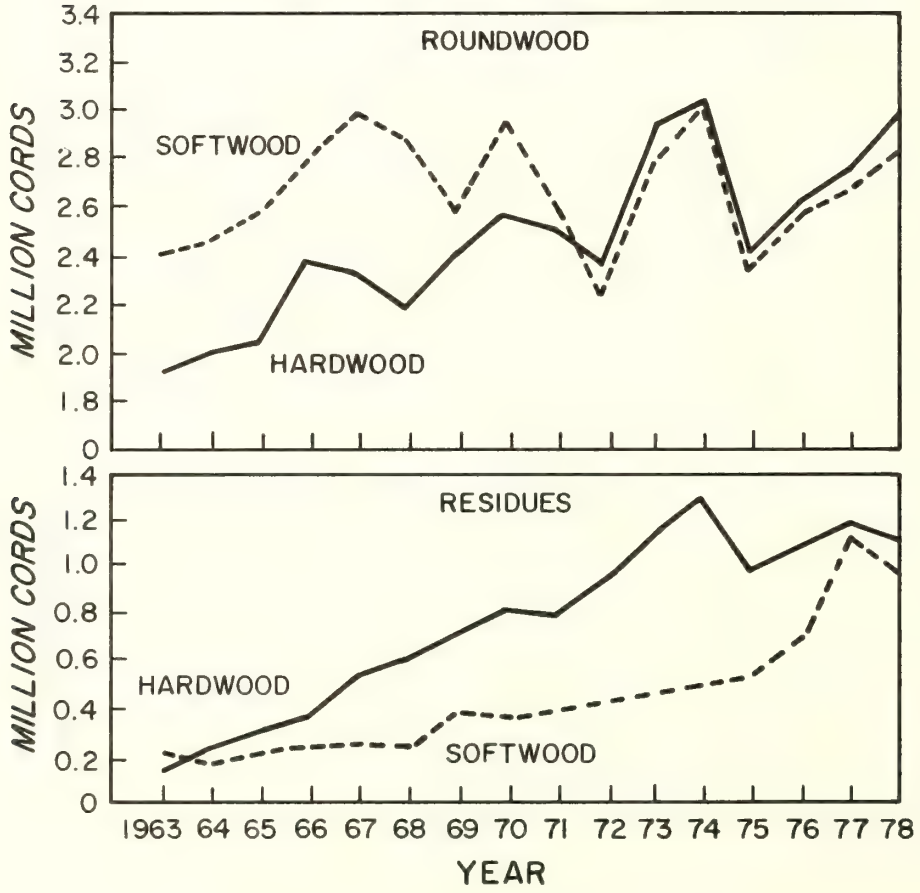
have been a growing source of pulp chips in the Northeast, are also well suited for producing energy wood. As alternate energy costs continue to climb, more byproducts and round timber will be used for fuelwood.

Another industry which competes directly with the woodpulp industry for raw material is the board industry. At present, two plants are under construction in the Northeast —an oriented strand board plant at Claremont, New Hampshire, and a waferboard plant at Woodland, Maine. The former will use both plant residues and round timber; the latter will use round timber only. Their combined annual raw material requirement could reach 300,000 cord equivalents. (One standard cord equals 85 cubic feet (ft^3) or 2.41 cubic meters (m^3).)

PULPWOOD PRODUCTION RISES BY 3 PERCENT

The 7,884,800 cords of pulpwood produced in the 14 northeastern states (Connecticut, Delaware, Kentucky, Maine, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, and West Virginia) in 1978 (Table 1) represented an increase of 3 percent over the 7,668,200 cords reported in 1977, and a record high since annual surveys were begun in 1963. Production of both softwood and hardwood roundwood was higher in 1978 than in 1977, but production of both softwood and hardwood chips from manufacturing residues was down for the period (Fig. 1). Some observers attribute this drop to a diver-

Figure 1.—Pulpwood production for Northeastern States, by year and sources of wood.



sion of chipped residues for industrial fuel. Hardwood roundwood production outperformed the other components of total production, increasing by 8 percent between 1977 and 1978. Softwood roundwood increased by 7 percent over the previous year and softwood and hardwood chipped residue production decreased by 10 and 5 percent, respectively.

Monthly pulpwood use in the Northeast was ahead of 1977 levels during the first part of the year, but tended to trail off during the fall. This caused woodyard inventories to build toward the end of 1978.

Roundwood pulpwood production from hardwoods exceeded that from softwoods by only 137,200 cords. While roundwood production increased by 7 percent from 1977, chipped residue production decreased by 8 percent. Hardwoods accounted for 52 percent of all pulpwood produced in 1978, up 1 percent from 1977.

Receipts of pulpwood at woodpulp mills in the Northeast totaled 8,544,400 cords in 1978, up more than 1 percent from 1977. This total represented a record high, breaking the previous record of 8,462,700 cords set in 1974. The 1978 receipts include wood harvested in the Northeast and pulpwood imported from other regions. Hardwood receipts exceeded those of softwoods by 45,400 cords, reversing last year's trend. Total receipts exceeded total production by 659,600 cords (Table 2).

Six of the 14 states (Connecticut, Delaware, Massachusetts, New York, Vermont, and West Virginia) produced more wood than they received. Delaware, Massachusetts, and West Virginia had no operating woodpulp mills, so all production in those states was shipped to other states for manufacture. Vermont had only one operating pulpmill. Production declined between 1977 and 1978 in only six of the northeastern states. Production declined by more than 20 percent in Massachusetts, Rhode Island, and Ohio. The decline in production in Rhode Island was caused by the closure of that state's only pulpmill. Production increases of more than 10 percent were registered in Connecticut, Maryland, and Pennsylvania. In Ohio and Rhode Island, pulpwood receipts declined by more than 15 percent. An increase in pulpwood receipts of 25 percent or more over 1977 levels was registered in New Jersey.

In previous years, a major portion of the requirement for pulpwood in the Northeast was satisfied by imports of Canadian softwood. This trend has been changing as more southern pulpwood has been finding its way into northern woodyards and as pulpmills use larger amounts of hardwood. In 1978, about 35 percent of the pulpwood shipments into the Northeast came from Canada, and 49 percent came from the southern states. The remaining 16 percent came from the North Central States. Although softwood roundwood imports were greater than hardwood imports in 1978, the reverse was true for imports of chipped manufacturing residue.

PRODUCTION FROM ROUNDWOOD UP BY 7 PERCENT

The production of pulpwood from roundwood increased by 392,600 cords—an increase of 7 percent from 1977. The 5,769,600 cords of roundwood produced in 1978 represent a continuation of the incremental climb that began in 1975 when a periodic low was reached during an economic slowdown. In 1966, roundwood production in the Northeast first exceeded 5 million cords and it has remained above that level for 10 of the last 13 years.

The 1978 pulpwood production from roundwood was up from 1977 in 6 of the 14 states. Delaware, Maine, Maryland, New Jersey, New York, and Pennsylvania all registered production increases. Pennsylvania's 19-percent production gain was the greatest year-to-year percentage increase. Roundwood production in Maine, which showed the largest volume increase—374,500 cords—accounted for more than 55 percent of the total northeastern harvest. Ohio had the largest year-to-year decline in pulpwood harvest—declining by 34,900 cords to 251,800 cords in 1978.

EIGHTEEN COUNTIES TOP 50-THOUSAND-CORD MARK

Eighteen counties in four states produced more than 50,000 cords of pulpwood from roundwood in 1978. This is a decrease of 1 county from 1977 when counties in 6 of the 14 states were high producers. The 3.8 million cords of roundwood harvested from these counties represents nearly two-thirds of the total roundwood harvest in the Northeast.

The position of the first nine counties on the list did not change between 1977 and 1978. However, one Maine county was added to the list in 1978 and the single high-producing counties in Pennsylvania and Ohio were dropped. As in previous years, Maine counties dominated the high-producer list, accounting for 9 of the 18 counties listed. Counties that produced more than 50,000 cords of pulpwood from roundwood in 1978 and their production totals are:

County	*Production (thousand cords)*
Aroostook, Maine	651.3
Piscataquis, Maine	581.8
Somerset, Maine	454.2
Washington, Maine	330.8
Oxford, Maine	287.2
Penobscot, Maine	285.5
Coos, New Hampshire	216.2
Franklin, Maine	158.6
Essex, Vermont	116.8
Kennebec, Maine	112.0
Essex, New York	84.6
Franklin, New York	84.5
Warren, New York	84.2
Hamilton, New York	75.1
Carroll, New Hampshire	75.0
Hancock, Maine	72.8
Saratoga, New York	64.4
St. Lawrence, New York	51.5

TOTAL-TREE UTILIZATION

The acceptance of harvesting and chipping the entire above-ground portion of the tree continues to grow in the Northeast as more logging contractors are involved in clearing forest land. By adding a baffle to the outfeed of the currently produced harvesting system, much of the leaves and bark are left at the harvesting site (see cover), thus upgrading the final product. Most total-tree chips produced in the region are used to produce kraft pulp from hardwoods.

Output increased most rapidly between 1974 and 1976 as output doubled from 236,100 cords to 472,400 cords. After a slight decline in 1977, the output of total-tree chips increased by 16 percent in the Northeast from 1977 to 1978:

State	*1977 (thousand cords)*	*1978 (thousand cords)*	*Change (percent)*
Kentucky	3.2	2.4	-25
Maine	142.5[b]	124.1[b]	-13
Maryland	5.7	20.0	[a]
New Hampshire	97.8	62.3	-36
New York	18.4	19.4	+ 5
Ohio	132.4	195.9	+48
Pennsylvania	6.6	71.7	[a]
Vermont	34.9	27.2	-22
West Virginia	9.0	0.4	-96
Total	450.4	523.3	+16

[a] Greater than 100 percent
[b] Includes all forms of brown, unbarked chips, such as bole- and tree-length material.

In 1978, chip production increased in four states and decreased in five. Three New England states, Maine, New Hampshire, and Vermont, experienced decreases in production in 1978. This may indicate that the chips are being diverted for energy related uses. Production increased in these Middle Atlantic States that are large hardwood producers—New York, Ohio, Pennsylvania, and Maryland. Maryland and Pennsylvania had the greatest percentage gains—over 100 percent—and Ohio and Pennsylvania had the greatest volume increases in 1978. The 195,900 cords of output in Ohio comprised

over three-fourths of the State's total roundwood production and over half of the total pulpwood production.

Production of total-tree chips was highest in Ohio and Maine in 1978. The combined production for these states represented three-fifths of the production total. The 124,100 cords produced in Maine, however, represented only 3 percent of the State's 1978 production total.

ROUNDWOOD HARVEST RELATED TO GROWING-STOCK INVENTORY

Figures 3, 4, and 5 show the total roundwood harvest by production class and county in the Northeast, but they do not relate the volume harvested to the volume of growing-stock trees that are actually present. Growing-stock volume is net volume in cubic feet of sound live trees of commercial species that are 5.0 inches in diameter at breast height (dbh) or larger, from a 1-foot stump to a minimum 4.0-inch top diameter outside bark of the central bole, or to the point where the bole breaks into limbs. The growing-stock volumes by species group and state that are used for this comparison are based on data compiled for the 1977 Forest Statistics of the United States.

The following tabulation of harvesting intensity shows the volume of growing stock present per unit harvested—by state and species group—in thousand cubic feet of growing stock present for each cord of pulpwood harvested in 1978:

Softwoods

Delaware	6.1
Maryland	6.9
Maine	7.6
New Jersey	9.0
Average	11.5
Vermont	19.0
New York	20.3
New Hampshire	27.4
West Virginia	33.9
Ohio	34.8
Pennsylvania	54.5
Connecticut	96.6
Kentucky	150.2
Rhode Island	269.7
Massachusetts	350.9

Hardwoods

Maine	6.4
Ohio	18.5
New Hampshire	19.2
New York	21.1
Vermont	27.3
Average	28.5
Pennsylvania	35.2
Maryland	38.0
Delaware	48.0
West Virginia	103.4
Kentucky	247.2
Rhode Island	506.8
New Jersey	986.2
Connecticut	3,729.0
Massachusetts	4,908.6

The states have been ranked (top to bottom) from the state in which the roundwood harvest was most intensive to the state in which the harvest was least intensive. The average for the region is shown where it falls in the rankings. These rankings and the regional averages should not be viewed as an index or standard for harvesting, but simply as a means of directing individuals engaged in pulpwood procurement from several alternative areas toward the most promising one.

For each cord of pulpwood harvested in the Northeast in 1978, there were 11,500 cubic feet (135 cords) of softwood growing stock and 28,500 cubic feet (335 cords) of hardwood growing stock. Harvesting intensity for softwoods was greater than the regional average in four states: Delaware, Maryland, Maine, and New Jersey. The hardwood harvest was more intensive than the regional average in five states: Maine, Ohio, New Hampshire, New York, and Vermont. Harvesting intensity was relatively low in the urbanized states and in those states that have few or no operating pulpmills.

WOOD CHIP PRODUCTION DECLINES BY 8 PERCENT

The production of wood chips and sawdust from plant residues for use as wood pulp declined by 8 percent from the record 2,291,200 cord equivalents produced in 1977. Some observers believe the decrease occurred because woody material that had been previously used for pulp chips was diverted for industrial fuel. The skyrocketing cost of fuel oil and other energy materials combined with tighter regulation on residue disposal have encouraged primary manufacturers to install wood- and bark-burning boilers.

Chip production in 1978 constituted 27 percent of the total pulpwood production, down 3 percent from 1977. Softwood chip production declined by 10 percent while hardwood chip production declined by 5 percent. Since 1977, pulpwood chip production declined in 8 of the 14 northeastern states and increased in 5:

State	*1977 (thousand cord equivalents)*	*1978*	*Change (percent)*
Connecticut	3.5	6.1	+74
Delaware	13.5	9.2	-30
Kentucky	215.5	229.5	+ 6
Maine	900.0	770.2	-14
Maryland	106.1	127.1	+20
Massachusetts	34.1	23.1	-32
New Hampshire	147.7	83.9	+25
New Jersey	5.4	4.1	-24
New York	158.9	152.5	- 4
Ohio	175.6	119.8	-32
Pennsylvania	299.5	294.3	- 2
Rhode Island	[a]	[a]	[a]
Vermont	73.6	75.7	+ 3
West Virginia	158.1	119.3	-25
	2,291.2	2,115.2	- 8

[a] Less than 50 cords or 0.5 percent.

Production records were set in Connecticut, Maryland, New Hampshire, and Vermont even though total production was down. Delaware, Massachusetts, and Ohio experienced production declines of 30 percent or more.

APPENDIX

Definition of Terms

Commercial species. Tree species presently or prospectively suitable for industrial wood products.

Diameter at breast height (dbh). The diameter outside bark of a standing tree measured at 4½ feet, or 1.3716 meters, above the ground.

Growing-stock trees. Live trees of commercial species classified as sawtimber, poletimber, saplings, and seedlings; that is, all live trees of commercial species except rough and rotten trees.

Growing-stock volume. The net volume in cubic feet of growing-stock trees 5.0 inches dbh or larger, from a 1-foot stump to a minimum 4.0-inch top diameter outside bark of the central stem, or to the point where the bole breaks into limbs. Net volume equals gross volume less deduction for cull.

Hardwoods. Dicotyledonous trees, usually broad-leaved and deciduous.

Harvest. The aggregate volume of timber produced for industrial or consumer uses.

Harvesting intensity. The growing-stock volume present in an area for each unit of timber production from the area, such as cubic feet of trees per cord of pulpwood.

Manufacturing plant or wood residues. Wood materials, such as sawmill slabs and edgings, sawdust, veneer clippings and cores, post and pole trimmings, and pulp screening obtained incidental to the manufacture of wood products.

Pulpwood. Roundwood converted into 4- or 5-foot lengths or chips and chipped plant residues that are used to make woodpulp.

Pulpwood receipts. Pulpwood received at woodpulp mills.

Pulpwood imports. Pulpwood receipts originating from outside the region.

Roundwood products. Logs, bolts, total-tree chips, and other round timber generated by harvesting trees for industrial or consumer use.

Softwoods. Coniferous trees, usually evergreen having needles or scalelike leaves.

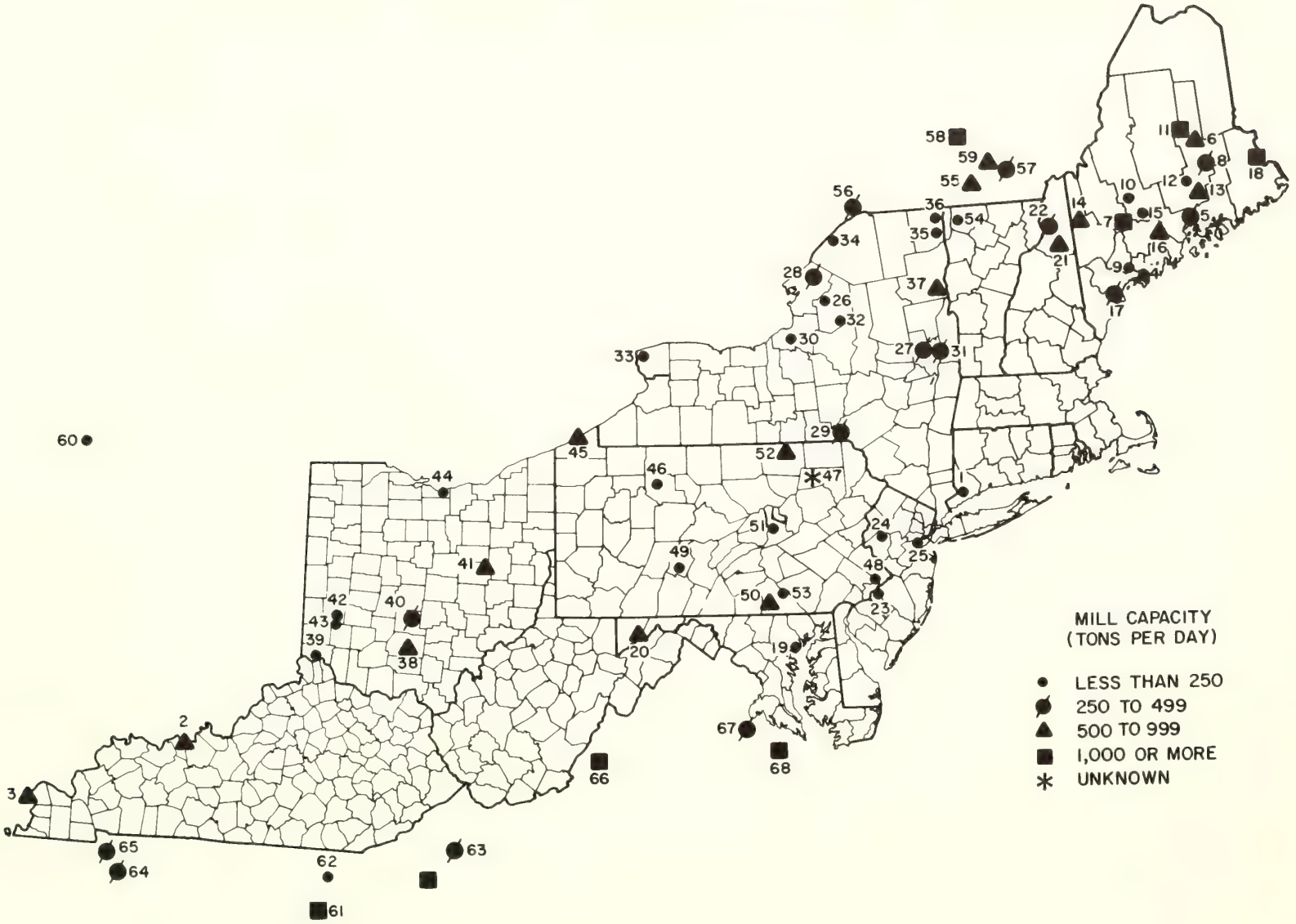
Standard cord. A unit of measure for stacked bolts of wood, encompassing 128 cubic feed of wood, bark, and air space. In the Northeast, the measure refers to a stack of wood containing 85 cubic feet, or 2.41 cubic meters, of solid wood.

Standard-cord equivalent. A unit of measure that is applied to forms of wood other than roundwood, such as chips, slabs, edgings, and other manufacturing residues and equal to 85 cubic feet of solid wood.

Timber products output. Production total from timber harvesting and plant byproduct recovery.

Total-tree chips. Unbarked wood chips generated from the aboveground portion of a tree, including bolewood, limbs, and leaves.

Figure 2.—Mills using northeastern pulpwood in 1978.



Woodpulp mills using northeastern pulpwood by location, type of pulp produced, and oven-dry capacity in tons per 24 hours, 1978

Location	Company	Type of pulp produced					
		Total	Sulfate	Ground-wood	Semi-chemical	Sulfite	Miscellaneous[a]
	WITHIN THE NORTHEAST						
Connecticut:							
1. Stratford	Tilo Company, Inc.	35	—	—	—	—	35
Total (1 mill)		35	—	—	—	—	35
Kentucky:							
2. Hawesville	Western Kraft Paper Group Willamette Industries, Inc.[b]	620	320	—	300	—	—
3. Wickliffe	Westvaco Corp.	600	600	—	—	—	—
Total (3 mills)		1,220	920	—	300	—	—
Maine:							
4. Brunswick	Pejepscot Paper Co.	160	—	160	—	—	—
5. Bucksport	St. Regis Paper Co.[b]	500	—	350	—	—	150
6. East Millinocket	Great Northern Nekoosa Corp.	800	—	800	—	—	—
7. Jay	International Paper Co.[b]	1,350	1,200	150	—	—	—
8. Lincoln	Preco Corp.	360	360	—	—	—	—
9. Lisbon Falls	United States Gypsum Co.	100	—	100	—	—	—
10. Madison	Madison Paper Corp.	120	—	120	—	—	—
11. Millinocket	Great Northern Nekoosa Corp.[b]	1,500	—	900	—	600	—
12. Old Town	Lily Tulip Corp.	50	—	50	—	—	—
13. Old Town	Diamond International Corp.[b]	575	575	—	—	—	—
14. Rumford	Boise Cascade Corp.[b]	705	595	110	—	—	—
15. Shawmut	Keyes Fibre Co.	120	—	120	—	—	—
16. Skowhegan	Scott Paper Co.	750	750	—	—	—	—
17. Westbrook	Scott Paper Co.	300	300	—	—	—	—
18. Woodland	Georgia-Pacific Corp.[b]	1,040	800	240	—	—	—
Total (21 mills)		8,430	4,580	3,100	—	600	150
Maryland:							
19. Finksburg	Congoleum Corp.	45	—	—	—	—	45
20. Luke	Westvaco Corp.	789	789	—	—	—	—
Total (2 mills)		834	789	—	—	—	45
New Hampshire:							
21. Berlin	Brown Co.[b]	925	725	—	200	—	—
22. Groveton	Diamond International Corp.	250	—	—	250	—	—
Total (3 mills)		1,175	725	—	450		—
New Jersey:							
23. Gloucester City	GAF Corp.	192	—	—	—	—	192
24. Manville	Johns-Manville Products Corp.	81	—	—	—	—	81
25. Perth Amboy	Jim Walter Corp.	100	—	—	—	—	100
Total (3 mills)		373	—	—	—	—	373

Continued

Location	Company	Type of pulp produced					
		Total	Sulfate	Ground-wood	Semi-chemical	Sulfite	Miscellaneous[a]
New York:							
26. Beaver Falls	Boise Cascade Corp.	70	—	70	—	—	—
27. Corinth	International Paper Co.	255	—	255	—	—	—
28. Deferiet	St. Regis Paper Co.	285	—	285	—	—	—
29. Deposit	Jim Walter Corp.	300	—	—	—	—	300
30. Fulton	Armstrong Cork Co.	130	—	—	—	—	130
31. Glens Falls	Finch, Pruyn & Co., Inc.	220	—	—	—	220	—
32. Lyons Falls	Georgia-Pacific Corp.	120	—	—	120	—	—
33. Niagara Falls	Nitec Paper Corp.	100	—	100	—	—	—
34. Ogdensburg	Diamond International Corp.	110	—	110	—	—	—
35. Plattsburgh	Diamond International Corp.	50	—	50	—	—	—
36. Plattsburgh	Georgia-Pacific Corp.	100	—	—	100	—	—
37. Ticonderoga	International Paper Co.	500	500	—	—	—	—
Total (12 mills)		2,240	500	870	220	220	430
Ohio:							
38. Chillicothe	The Mead Corp.	600	600	—	—	—	—
39. Cincinnati	Jim Walter Corp.	100	—	—	—	—	100
40. Circleville	Container Corp. of America	300	—	—	300	—	—
41. Coshocton	Stone Container Corp.[b]	650	—	—	650	—	—
42. Franklin	Bird & Son, Inc.	80	—	—	—	—	80
43. Franklin	Georgia-Pacific Corp.	85	—	—	—	—	85
44. Milan	Certain-Teed Corp.	90	—	—	—	—	90
Total (7 mills)		1,905	600	—	950	—	355
Pennsylvania:					—		
45. Erie	Hammermill Paper Co.	700	—	—	700	—	—
46. Johnsonburg	Penntech Papers, Inc.	190	190	—	—	—	—
47. Mehoopany	Proctor & Gamble Co.	c	—	—	—	c	—
48. Philadelphia	Jim Walter Corp.	160	—	—	—	—	160
49. Roaring Spring	Appleton Papers, Inc.	180	180	—	—	—	—
50. Spring Grove	The P.H. Glatfelter Co.	525	525	—	—	—	—
51. Sunbury	Jim Walter Corp.	240	—	—	240	—	—
52. Towanda	Masonite Corp.	500	—	—	—	—	500
53. York	Certain-Teed Corp.	50	—	—	—	—	50
Total (9 mills)		2,545	895	—	940	c	710
Vermont:							
54. Sheldon Springs	Saxon Industries	50	—	50	—	—	—
Total (1 mill)		50	—	50	—	—	—
All northeast states (62 mills)		18,807	9,009	4,020	2,860	820	2,098

Woodpulp Mills—Continued

OUTSIDE THE NORTHEAST							
Canada:							
55. Bromptonville	Kruger Pulp & Paper, Ltd.	500	500	—	—	—	—
56. Cornwall	Domtar Woodlands, Ltd.	400	400	—	—	—	—
57. East Angus	Domtar Woodlands, Ltd.[b]	340	220	—	120	—	—
58. Three Rivers	Kruger Pulp & Paper, Ltd.[b]	1,150	—	940	—	210	—
59. Windsor	Domtar Woodlands, Ltd.	500	500	—	—	—	—
Total (6 mills)		2,890	1,620	940	120	210	—
Illinois:							
60. Joliet	GAF Corp.	100	—	100	—	—	—
Total (1 mill)		100	—	100	—	—	—
Tennessee:							
61. Calhoun	Bowater Southern Paper Corp.[b]	1,700	550	925	—	—	225
62. Harriman	Harriman Paperboard Corp.	190	—	—	190	—	—
63. Kingsport	The Mead Corp.	270	—	—	—	270	—
64. New Johnsonville	Inland Container Corp.	450	—	—	450	—	—
65. Paris	Jim Walter Corp.	300	—	—	—	—	300
Total (7 mills)		2,910	550	925	640	270	525
Virginia:							
66. Covington	Westvaco Corp.[b]	1,260	1,100	—	160	—	—
67. Doswell	Weyerhauser	300	—	300	—	—	—
68. West Point	Chesapeake Corp. of Va.	1,150	1,150	—	—	—	—
Total (4 mills)		2,710	2,250	300	160	—	—
Total all other states (18 mills)		8,610	4,420	2,265	920	480	525
Total all states (80 mills)		27,417	13,429	6,285	3,780	1,300	2,623

[a]Roofing, insulation board, and hard board plants.
[b]More than one pulpmill operating.
[c]Capacity unknown.

INDEX TO TABLES

1. Total production of pulpwood in the Northeast, by source and state, 1978.
2. Total production and receipts of pulpwood in the Northeast, by state and softwood and hardwood, 1978.
3. Pulpwood production from roundwood in the Northeast, by state, softwood and hardwood, and destination of shipments, 1978.
4. Pulpwood chip production from manufacturing residues in the Northeast, by state, softwood and hardwood, and destination of shipments, 1978.
5. Pulpwood receipts from roundwood in the Northeast, by state, softwood and hardwood, and origin of shipments, 1978.
6. Pulpwood chip receipts from plant residues in the Northeast, by state, softwood and hardwood, and origin of shipments, 1978.
7. Pulpwood from roundwood received from states outside the Northeast, by state (or province) of origin and softwood and hardwood, 1978.
8. Pulpwood chip receipts from wood-using manufacturing plants outside the Northeast, by state (or province) of origin and softwood and hardwood, 1978.
9. Pulpwood production from roundwood in the Northeast, by state and selected species, 1978.
10. Pulpwood production from roundwood in Kentucky and Ohio, by state, county, and selected species, 1978.
11. Pulpwood production from roundwood in southern New England, by state, county, and selected species, 1978.
12. Pulpwood production from roundwood in northern New England, by state, county, and selected species, 1978.
13. Pulpwood production from roundwood in New York, by county and selected species, 1978.
14. Pulpwood production from roundwood in Pennsylvania, by county and selected species, 1978.
15. Pulpwood production from roundwood in Delaware, Maryland, and New Jersey, by county and selected species, 1978.
16. Pulpwood production from roundwood in West Virginia, by county and selected species, 1978.

Metric Equivalents

One standard cord = 85 cubic feet (ft^3) = 2.41 cubic meters (m^3)
One cubic foot (ft^3) = 28.317 cubic centimeters (cm^3) = 0.028 cubic meters (m^3)
One inch - 2.540 centimeters (cm)

Nevel, Robert L., Jr., and James T. Bones.

1980. **Northeastern pulpwood, 1978: An annual assessment f regional timber output.** Northeast. For. Exp. Stn., Broomall, I

27 p., illus, (USDA For. Serv. Resour. Bull. NE-6

This annual assessment of regional timber output is based on a c vass of the pulpmills in the Northeast. The report contains a cussion and tabular data on roundwood and chips from plant r dues produced in and received by 14 northeastern states in 19 pulpwood production by state, county, and selected species; pu wood receipts from roundwood by state and selected species; pu wood chip receipts by state and selected species; and production total-tree chips. From 1977 to 1978, pulpwood production creased by 3 percent; roundwood production rose by 7 percent; chipped residue production declined by 8 percent. Current rec levels are discussed and trends in pulpwood production for the 16 years are illustrated. A list of the woodpulp mills that recei northeastern pulpwood during 1978 is included.

861.0(74):721:792

Keywords: Pulpwood, Northeast, timber output.

Nevel, Robert L., Jr., and James T. Bones.

1980. **Northeastern pulpwood, 1978: An annual assessment f regional timber output.** Northeast. For. Exp. Stn., Broomall,

27 p., illus, (USDA For. Serv. Resour. Bull. NE-

This annual assessment of regional timber output is based on a vass of the pulpmills in the Northeast. The report contains a cussion and tabular data on roundwood and chips from plant dues produced in and received by 14 northeastern states in 19 pulpwood production by state, county, and selected species; pu wood receipts from roundwood by state and selected species; pu wood chip receipts by state and selected species; and productio total-tree chips. From 1977 to 1978, pulpwood production creased by 3 percent; roundwood production rose by 7 percent; chipped residue production declined by 8 percent. Current rec levels are discussed and trends in pulpwood production for the 16 years are illustrated. A list of the woodpulp mills that recei northeastern pulpwood during 1978 is included.

861.0(74):721:792

Keywords: Pulpwood, Northeast, timber output.

Nevel, Robert L., Jr., and James T. Bones.

1980. **Northeastern pulpwood, 1978: An annual assessment of regional timber output.** Northeast. For. Exp. Stn., Broomall, Pa.

27 p., illus, (USDA For. Serv. Resour. Bull. NE-62)

This annual assessment of regional timber output is based on a canvass of the pulpmills in the Northeast. The report contains a discussion and tabular data on roundwood and chips from plant residues produced in and received by 14 northeastern states in 1978: pulpwood production by state, county, and selected species; pulpwood receipts from roundwood by state and selected species; pulpwood chip receipts by state and selected species; and production of total-tree chips. From 1977 to 1978, pulpwood production increased by 3 percent; roundwood production rose by 7 percent; and chipped residue production declined by 8 percent. Current record levels are discussed and trends in pulpwood production for the past 16 years are illustrated. A list of the woodpulp mills that received northeastern pulpwood during 1978 is included.

Nevel, Robert L., Jr., and James T. Bones.

1980. **Northeastern pulpwood, 1978: An annual assessment of regional timber output.** Northeast. For. Exp. Stn., Broomall, Pa.

27 p., illus, (USDA For. Serv. Resour. Bull. NE-62)

This annual assessment of regional timber output is based on a canvass of the pulpmills in the Northeast. The report contains a discussion and tabular data on roundwood and chips from plant residues produced in and received by 14 northeastern states in 1978: pulpwood production by state, county, and selected species; pulpwood receipts from roundwood by state and selected species; pulpwood chip receipts by state and selected species; and production of total-tree chips. From 1977 to 1978, pulpwood production increased by 3 percent; roundwood production rose by 7 percent; and chipped residue production declined by 8 percent. Current record levels are discussed and trends in pulpwood production for the past 16 years are illustrated. A list of the woodpulp mills that received northeastern pulpwood during 1978 is included.

634.0(74):721:792

Keywords: Pulpwood, Northeast, timber output.

Table 1.—Total production of pulpwood in the Northeast, by state and source, 1978

(In thousands of standard cords)[a]

State	Source		
	Roundwood	Manufacturing residues	All sources
Connecticut	5.0	6.1	11.1
Delaware	37.3	9.2	46.5
Kentucky	50.8	229.5	280.3
Maine	3,184.8	770.2	3,955.0
Maryland	186.0	127.1	313.1
Massachusetts	4.6	23.5	28.1
New Hampshire	324.2	183.9	508.1
New Jersey	29.1	4.1	33.2
New York	649.7	152.5	802.2
Ohio	251.8	119.8	371.6
Pennsylvania	674.7	294.3	969.0
Rhode Island	1.0	b	1.0
Vermont	212.1	75.7	287.8
West Virginia	158.5	119.3	277.8
All states	5,769.6	2,115.2	7,884.8

[a]Rough wood basis, equivalent to 85 ft^3 solid wood.
[b]Less than 50 cord equivalents.

Table 2.—Total production and receipts of pulpwood in the Northeast, by state and softwood and hardwood, 1978

(In thousands of standard cords)

State	Production		Receipts		Production surplus (+) or deficit (-)
	Softwood	Hardwood	Softwood	Hardwood	
Connecticut	7.5	3.6	(D)	(D)	+(D)
Delaware	34.0	12.5	—	—	+46.5
Kentucky	10.6	269.7	181.4	475.2	-376.3
Maine	2,844.8	1,110.2	3,218.0	1,185.8	-448.8
Maryland	183.0	130.1	124.4	269.7	-81.0
Massachusetts	15.1	13.0	—	—	+28.1
New Hampshire	257.7	250.4	141.2	369.8	-2.9
New Jersey	29.7	3.5	60.3	12.5	-39.6
New York	213.0	589.2	265.1	506.1	+31.0
Ohio	4.7	366.9	20.0	469.9	-118.3
Pennsylvania	45.5	923.5	207.2	1,004.1	-242.3
Rhode Island	.4	.6	(D)	(D)	-(D)
Vermont	123.7	164.1	(D)	(D)	+(D)
West Virginia	37.6	240.2	—	—	+277.8
Total	3,807.3	4,077.5	4,249.5	4,294.9	-659.6

(D) Withheld to avoid disclosure of data from individual mills.

Table 3.—Pulpwood production from roundwood in the Northeast, by state, softwood and hardwood, and destination of shipments, 1978

(In thousands of standard cords)

State	Softwood				Hardwood				All Species
	Retained in state	Shipped to other states		Total	Retained in state	Shipped to other states		Total	
		In Northeast	Outside Northeast			In Northeast	Outside Northeast		
Connecticut	3.7	0.7	—	4.4	—	0.6	—	0.6	5.0
Delaware	—	13.9	13.9	27.8	—	9.4	0.1	9.5	37.3
Kentucky	—	—	6.1	6.1	23.8	10.0	10.9	44.7	50.8
Maine	2,137.0	20.9	.5	2,158.4	972.3	54.1	—	1,026.4	3,184.8
Maryland	18.2	48.3	48.4	114.9	52.7	17.7	.7	71.1	186.0
Massachusetts	—	4.1	—	4.1	—	.5	—	.5	4.6
New Hampshire	35.6	92.6	.4	128.6	153.8	41.8	—	195.6	324.2
New Jersey	27.8	—	—	27.8	1.1	.2	—	1.3	29.1
New York	138.9	3.1	35.2	177.2	366.9	35.4	70.2	472.5	649.7
Ohio	—	4.4	—	4.4	246.9	.5	—	247.4	251.8
Pennsylvania	22.3	11.6	—	33.9	595.9	44.9	—	640.8	674.7
Rhode Island	.4	—	—	.4	.6	—	—	.6	1.0
Vermont	21.2	73.5	1.3	96.0	—	116.1	—	116.1	212.1
West Virginia	—	30.0	2.2	32.2	—	72.8	53.5	126.3	158.5
All states	2,405.1	303.1	108.0	2,816.2	2,414.0	404.0	135.4	2,953.4	5,769.6

Table 4.—Pulpwood chip production from manufacturing residues in the Northeast, by state, softwood and hardwood, and destination of shipments, 1978[a]

(In thousands of standard-cord equivalents)

State	Softwood				Hardwood				All species
	Retained in state	Shipped to other states		Total	Retained in state	Shipped to other states		Total	
		In Northeast	Outside Northeast			In Northeast	Outside Northeast		
Connecticut	[b]	3.1	—	3.1	—	3.0	—	3.0	6.1
Delaware	—	6.2	—	6.2	—	3.0	—	3.0	9.2
Kentucky	—	4.0	0.5	4.5	138.0	58.4	28.6	225.0	229.5
Maine	685.9	.5	—	686.4	77.0	6.8	—	83.8	770.2
Maryland	3.7	48.4	16.0	68.1	17.3	38.1	3.6	59.0	127.1
Massachusetts	—	11.0	—	11.0	—	12.5	—	12.5	23.5
New Hampshire	59.2	68.6	1.3	129.1	47.4	7.4	—	54.8	183.9
New Jersey	—	1.9	—	1.9	—	2.2	—	2.2	4.1
New York	20.4	15.4	—	35.8	50.2	53.5	13.0	116.7	152.5
Ohio	[b]	.3	—	.3	117.3	2.2	—	119.5	119.8
Pennsylvania	9.0	2.6	—	11.6	237.6	45.1	—	282.7	294.3
Rhode Island	—	—	—	—	—	[b]	—	[b]	[b]
Vermont	—	26.4	1.3	27.7	—	47.7	0.3	48.0	75.7
West Virginia	—	1.8	3.6	5.4	—	53.9	60.0	113.9	119.3
All states	788.2	190.2	22.7	991.1	648.8	333.8	105.5	1,124.1	2,115.2

[a] Includes sawmill slabs and edgings, sawdust, veneer cores, and post and piling trimmings.
[b] Less than 50 cords.

Table 5.—Pulpwood receipts from roundwood in the Northeast, by state, softwood and hardwood, and origin of shipments, 1978

(In thousands of standard cords)

State[a]	Softwood				Hardwood				All species
	Cut in state	Received from other states		Total	Cut in state	Received from other states		Total	
		In Northeast	Outside Northeast			In Northeast	Outside Northeast		
Connecticut	3.7	(D)	(D)	(D)	—	(D)	(D)	(D)	(D)
Kentucky	—	—	134.1	123.1	23.8	—	111.3	135.1	269.2
Maine	2,137.0	65.2	134.8	2,337.0	972.3	46.0	78.3	1,096.6	3,433.6
Maryland	18.2	40.1	41.3	99.6	52.7	113.4	7.6	173.7	273.3
New Hampshire	35.6	34.2	—	69.8	153.8	144.5	.2	298.5	368.3
New Jersey	27.8	3.8	—	31.6	1.1	—	—	1.1	32.7
New York	138.9	87.5	.2	226.6	366.9	24.9	.2	392.0	618.6
Ohio	—	—	—	—	246.9	10.6	9.5	267.0	267.0
Pennsylvania	22.3	67.4	63.2	152.9	595.9	63.4	8.6	667.9	820.8
Rhode Island	.4	(D)	(D)	(D)	.6	(D)	(D)	(D)	(D)
Vermont	21.2	(D)	(D)	(D)	—	(D)	(D)	(D)	(D)
All states	2,405.1	303.1	373.6	3,081.8	2,414.0	403.9	215.7	3,033.6	6,115.4

[a]States with no pulpmills are omitted.
(D) Withheld to avoid disclosure of data from individual mills.

Table 6.—Pulpwood chip receipts from manufacturing residues in the Northeast, by state, softwood and hardwood, and origin of shipments, 1978 [a]

(In thousands of standard-cord equivalents)

State[b]	Softwood				Hardwood				All species
	Produced in state	Received from other states		Total	Produced in state	Received from other states		Total	
		In Northeast	Outside Northeast			In Northeast	Outside Northeast		
Connecticut	[c]	(D)	(D)	(D)	—	(D)	(D)	(D)	(D)
Kentucky	—	—	47.3	47.3	138.0	—	202.1	340.1	387.4
Maine	685.9	72.7	122.4	881.0	77.0	10.4	1.8	89.2	970.2
Maryland	3.7	3.3	17.8	24.8	17.3	71.8	6.9	96.0	120.8
New Hampshire	59.2	11.8	.4	71.4	47.4	21.5	2.4	71.3	142.7
New Jersey	—	28.7	—	28.7	—	11.4	—	11.4	40.1
New York	20.4	18.1	—	38.5	50.2	46.5	17.4	114.1	152.6
Ohio	[c]	15.1	4.9	20.0	117.3	84.9	.7	202.9	222.9
Pennsylvania	9.0	39.4	5.9	54.3	237.6	86.2	12.4	336.2	390.5
Rhode Island	—	(D)	(D)	(D)	—	(D)	(D)	(D)	(D)
Vermont	—	(D)	(D)	(D)	—	(D)	(D)	(D)	(D)
All states	778.2	190.8	198.7	1,167.7	684.8	332.8	243.7	1,261.3	2,429.0

[a]Includes sawmill slabs and edgings, sawdust, veneer cores, and post and pole trimmings.
[b]States with no pulpmills are omitted.
[c]Less than 50 cords.
(D) Withheld to avoid disclosure of data from individual mills.

Table 7.—Pulpwood production from roundwood received from states outside the Northeast, by state (or province) of origin and softwood and hardwood, 1978

(In thousands of standard cords)

Receiving state[a]	State or province of origin	Total softwood	Total hardwood	All species
Kentucky	Illinois	6.3	12.7	19.0
	Indiana	—	9.8	9.8
	Mississippi	117.7	56.7	174.4
	Missouri	.4	7.7	8.1
	Tennessee	9.7	24.4	34.1
Maine	New Brunswick	122.4	77.2	199.6
	Quebec	12.4	1.1	13.5
Maryland	Virginia	41.3	7.6	48.9
New Hampshire	Quebec	—	.2	.2
New York	Ontario	.2	.1	.3
	Quebec	—	.1	.1
Ohio	Indiana	—	7.1	7.1
	Tennessee	—	2.4	2.4
Pennsylvania	Virginia	63.2	8.6	71.8
All states		373.6	215.7	589.3

[a]States with no extraregional receipts are omitted.

Table 8.—Pulpwood chip receipts from wood-using manufacturing plants outside the Northeast, by state (or province) of origin and softwood and hardwood, 1978[a]

(In thousands of standard-cord equivalents)

Receiving state[b]	State or province of origin	Softwood	Hardwood	All species
Kentucky	Alabama	—	4.1	4.1
	Arkansas	—	14.4	14.4
	Illinois	1.6	25.7	27.3
	Indiana	—	57.6	57.6
	Mississippi	43.0	13.8	56.8
	Missouri	2.7	38.0	39.7
	Tennessee	—	48.5	48.5
Maine	New Brunswick	3.9	—	3.9
	Quebec	118.5	1.8	120.3
Maryland	Virginia	17.8	6.9	24.7
New Hampshire	Quebec	.4	2.4	2.8
New York	Ontario	—	17.3	17.3
	Quebec	—	.1	.1
Ohio	Alabama	.7	—	.7
	North Carolina	.8	—	.8
	Tennessee	.2	.7	.9
	Virginia	3.2	—	3.2
Pennsylvania	Virginia	5.9	12.4	18.3
All states		198.7	243.7	442.4

[a]Includes sawmill slabs and edgings, sawdust, veneer cores, and post and pole trimmings.
[b]States with no extraregional receipts are omitted.

Table 9.—Pulpwood production from roundwood in the Northeast, by state and selected species, 1978

(In thousands of standard cords)

State	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Connecticut	—	—	4.4	4.4	—	0.2	0.4	0.6	5.0
Delaware	—	—	27.8	27.8	—	3.8	5.7	9.5	37.3
Kentucky	—	—	6.1	6.1	2.7	29.4	12.6	44.7	50.8
Maine	1,720.0	232.0	206.2	2,158.4	60.7	24.4	941.3	1,026.4	3,184.8
Maryland	—	0.8	114.1	114.9	—	31.0	40.1	71.1	186.0
Massachusetts	[a]	—	4.1	4.1	—	.2	.3	.5	4.6
New Hampshire	97.5	11.4	19.7	128.6	13.9	3.2	178.5	195.6	324.1
New Jersey	—	—	27.8	27.8	[a]	.1	1.2	1.3	29.1
New York	55.4	34.5	87.3	177.2	39.5	57.2	375.8	472.5	649.7
Ohio	—	—	4.4	4.4	1.7	149.0	96.7	247.4	251.8
Pennsylvania	—	3.9	30.0	33.9	42.6	257.8	340.8	640.8	674.7
Rhode Island	—	—	.4	.4	—	.3	.3	.6	1.0
Vermont	83.3	5.3	7.4	96.0	9.6	3.5	103.0	116.1	212.1
West Virginia	—	2.5	29.7	32.2	—	55.8	70.5	126.3	158.5
All states	1,956.4	290.4	569.4	2,816.2	170.7	615.9	2,166.8	2,953.4	5,769.6

[a]Less than 50 cords.

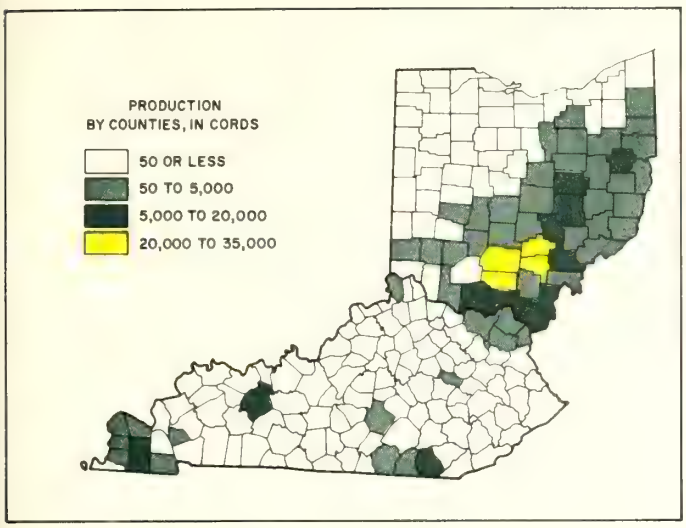


Figure 3.—Geographical pattern of pulpwood production from roundwood in Kentucky and Ohio, by county, 1978.

Table 10.—Pulpwood production from roundwood in Kentucky and Ohio, by state, county, and selected species, 1978

County[a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
					KENTUCKY				
Ballard	—	—	—	—	0.6	1.5	1.1	3.2	3.2
Boone	—	—	—	—	.5	.8	—	1.3	1.3
Boyd	—	—	—	—	—	.3	.5	.8	.8
Calloway	—	—	—	—	.1	.2	.2	.5	.5
Carlisle	—	—	—	—	.4	1.0	.7	2.1	2.1
Carter	—	—	—	—	—	.7	1.2	1.9	1.9
Casey	—	—	—	—	—	3.3	—	3.3	3.3
Flaming	—	—	b	b	—	—	—	—	b
Floyd	—	—	—	—	—	b	b	b	b
Graves	—	—	—	—	.3	3.9	3.7	7.9	7.9
Greenup	—	—	—	—	—	1.3	1.7	3.0	3.0
Hickman	—	—	—	—	.2	.2	.3	.7	.7
Lewis	—	—	—	—	—	.6	1.0	1.6	1.6
Lyon	—	—	—	—	—	.1	—	.1	.1
McCracken	—	—	—	—	.3	.6	.4	1.3	1.3
McCreary	—	—	2.4	2.4	—	.6	.7	1.3	3.7
Ohio	—	—	—	—	—	11.2	—	11.2	11.2
Rowan	—	—	—	—	.3	.7	.4	1.4	1.4
Wayne	—	—	.1	.1	—	—	—	—	.1
Whitley	—	—	3.6	3.6	—	2.4	.7	3.1	6.7
Total	—	—	6.1	6.1	2.7	29.4	12.6	44.7	50.8
					OHIO				
Adams	—	—	b	b	—	3.6	5.8	9.4	9.4
Ashland	—	—	—	—	—	.8	—	.8	.8
Athens	—	—	0.4	0.4	—	8.5	7.5	16.0	16.4
Belmont	—	—	—	—	—	1.5	—	1.5	1.5
Brown	—	—	—	—	—	.1	b	.1	.1
Butler	—	—	—	—	—	—	.1	.1	.1
Carroll	—	—	—	—	—	5.4	—	5.4	5.4
Clark	—	—	—	—	0.3	.4	—	.7	.7
Clinton	—	—	—	—	.1	.2	.1	.4	.4
Columbiana	—	—	—	—	—	.4	—	.4	.4
Coshocton	—	—	—	—	—	15.9	—	15.9	15.9
Erie	—	—	—	—	—	—	b	b	b

Continued

Table 10—Continued

County[a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Fairfield	—	—	—	—	—	2.5	1.5	4.0	4.0
Fayette	—	—	—	—	—	1.3	1.9	3.2	3.2
Franklin	—	—	—	—	—	.8	.3	1.1	1.1
Gallia	—	—	.6	.6	—	3.7	5.1	8.8	9.4
Guernsey	—	—	—	—	—	3.2	—	3.2	3.2
Harrison	—	—	—	—	—	3.8	—	3.8	3.8
Hocking	—	—	—	—	—	12.6	9.7	22.3	22.3
Holmes	—	—	—	—	—	4.3	—	4.3	4.3
Jackson	—	—	—	b	—	3.3	1.1	4.4	4.4
Jefferson	—	—	—	—	—	.1	.1	.2	.2
Knox	—	—	—	—	—	.6	—	.6	.6
Lawrence	—	—	.4	.4	—	4.6	7.0	11.6	12.0
Licking	—	—	—	—	—	1.8	—	1.8	1.8
Madison	—	—	—	—	—	1.6	.5	2.1	2.1
Mahoning	—	—	2.2	2.2	—	—	—	—	2.2
Medina	—	—	—	—	—	.2	—	.2	.2
Meigs	—	—	.2	.2	—	.7	1.2	1.9	2.1
Miami	—	—	—	—	—	b	b	b	b
Monroe	—	—	—	—	—	1.2	—	1.2	1.2
Morgan	—	—	—	—	—	1.2	—	1.2	1.2
Muskingum	—	—	—	—	—	8.9	—	8.9	8.9
Noble	—	—	—	—	—	1.8	—	1.8	1.8
Perry	—	—	—	—	—	6.3	1.9	8.2	8.2
Pickaway	—	—	—	—	—	.6	.2	.8	.8
Pike	—	—	—	—	.9	11.1	15.7	27.7	27.7
Ross	—	—	—	—	.4	9.4	12.7	22.5	22.5
Scioto	—	—	b	b	—	6.9	11.1	18.0	18.0
Stark	—	—	—	—	—	.9	—	.9	.9
Trumbull	—	—	.6	.6	—	—	—	—	.6
Tuscarawas	—	—	—	—	—	2.3	—	2.3	2.3
Vinton	—	—	—	—	—	12.2	13.1	25.3	25.3
Warren	—	—	—	—	—	—	.1	.1	.1
Washington	—	—	—	—	—	3.9	—	3.9	3.9
Wayne	—	—	—	—	—	.4	—	.4	.4
Total	—	—	4.4	4.4	1.7	149.0	96.7	247.4	251.8

[a]Counties with no production are omitted.
[b]Less than 50 cords.

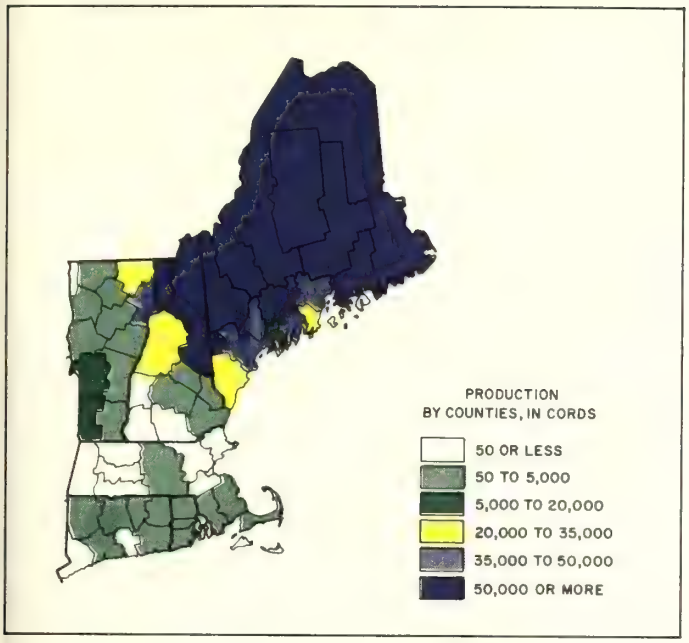


Figure 4.—Geographical pattern of pulpwood production from roundwood in the New England States, by county, 1978

Table 11.—Pulpwood production from roundwood in southern New England, by state, county, and selected species, 1978

(In thousands of standard cords)

County[a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
CONNECTICUT									
Hartford	—	—	1.7	1.7	—	—	—	—	1.7
Litchfield	—	—	1.1	1.1	—	b	0.1	0.1	1.2
New Haven	—	—	1.0	1.0	—	—	—	—	1.0
New London	—	—	.1	.1	—	b	.1	.1	.2
Tolland	—	—	.1	.1	—	b	b	b	.1
Windham	—	—	.4	.4	—	0.2	.2	.4	.8
Total	—	—	4.4	4.4	—	0.2	0.4	0.6	5.0
MASSACHUSETTS									
Barnstable	—	—	0.3	0.3	—	—	—	—	0.3
Berkshire	b	—	—	b	—	—	—	—	b
Bristol	—	—	.7	.7	—	0.1	0.1	0.2	.9
Plymouth	—	—	2.8	2.8	—	.1	.2	.3	3.1
Worcester	—	—	.3	.3	—	—	—	—	.3
Total	b	—	4.1	4.1	—	0.2	0.3	0.5	4.6
RHODE ISLAND									
Kent	—	—	0.1	0.1	—	0.1	0.2	0.3	0.4
Providence	—	—	.2	.2	—	.1	.1	.2	.4
Washington	—	—	.1	.1	—	.1	b	.1	.2
Total	—	—	0.4	0.4	—	0.3	0.3	0.6	1.0

[a]Counties with no production are omitted
[b]Less than 50 cords.

Table 12.—Pulpwood production from roundwood in northern New England, by state, county, and selected species, 1978

(In thousands of standard cords)

County[a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
MAINE									
Androscoggin	4.4	4.5	15.4	24.3	0.3	0.8	12.8	13.9	38.2
Aroostook	532.8	16.9	1.6	551.3	10.9	.5	88.6	100.0	651.3
Cumberland	3.0	6.5	18.0	27.5	1.6	3.3	14.8	19.7	47.2
Franklin	45.1	8.6	7.3	61.0	2.4	2.8	92.4	97.6	158.6
Hancock	40.0	3.6	2.0	45.6	.5	.1	26.6	27.2	72.8
Kennebec	18.6	25.3	28.5	72.4	1.4	1.0	37.2	39.6	112.0
Knox	6.2	5.0	7.4	18.6	.4	.4	7.2	8.0	26.6
Lincoln	7.7	9.0	19.8	36.5	.8	.7	11.1	12.6	49.1
Oxford	55.5	19.6	27.0	102.1	6.6	6.3	172.2	185.1	287.2
Penobscot	147.1	44.2	11.2	202.5	3.2	1.5	78.3	83.0	285.5
Piscataquis	401.0	31.3	10.5	442.8	3.1	2.3	133.6	139.0	581.8
Sagadahoc	2.9	1.9	9.4	14.2	.7	.3	4.0	5.0	19.2
Somerset	324.2	21.8	18.5	364.5	2.0	2.0	85.7	89.7	454.2
Waldo	19.0	6.4	6.7	32.1	.4	.5	12.4	13.3	45.4
Washington	112.0	24.8	8.6	145.4	25.9	.4	159.1	185.4	330.8
York	.7	2.6	14.3	17.6	.5	1.5	5.3	7.3	24.9
Total	1,720.2	232.0	206.0	2,158.4	60.7	24.4	941.3	1,026.4	3,184.8
NEW HAMPSHIRE									
Belknap	[b]	0.2	0.3	0.5	—	—	0.3	0.3	0.8
Carroll	24.9	7.2	8.4	40.5	0.8	0.1	33.6	34.5	75.0
Cheshire	—	—	—	—	—	—	[b]	[b]	[b]
Coos	68.6	2.6	2.5	73.7	11.1	2.5	128.9	142.5	216.2
Grafton	4.0	1.4	5.5	10.9	2.0	.6	16.9	16.9	27 8
Hillsborough	—	—	[b]	[b]	—	[b]	[b]	[b]	[b]
Merrimack	—	[b]	2.2	2.2	—	—	1.2	1.2	3.4
Rockingham	—	—	.3	.3	—	[b]	[b]	[b]	.3
Stratford	—	[b]	.5	.5	—	[b]	.2	.2	.7
Sullivan	—	—	—	—	—	[b]	[b]	[b]	[b]
Total	97.5	11.4	19.7	128.6	13.9	3.2	178.5	195.6	324.2
VERMONT									
Addison	0.3	0.1	[b]	0.4	—	0.1	1.1	1.2	1.6
Bennington	—	.2	0.2	.4	0.1	.4	5.0	5.5	5.9
Caledonia	20.1	1.3	2.2	23.6	1.2	.3	10.0	11.5	35.1
Chittenden	.4	—	.3	.7	—	—	[b]	[b]	.7
Essex	41.9	1.3	1.3	44.5	5.0	1.3	66.0	72.3	116.8
Franklin	.2	—	—	.2	—	—	—	—	.2
Lamoille	1.1	.1	.7	1.9	[b]	.1	.7	.8	2.7
Orange	.7	[b]	.2	.3	—	[b]	.1	.1	1.1
Orleans	15.2	1.4	.7	17.3	1.5	.4	11.3	13.2	30.5
Rutland	1.9	.1	1.4	3.4	.8	.3	3.4	4.5	7.9
Washington	.6	[b]	.1	.7	—	—	.1	.1	.8
Windham	—	.2	—	.2	[b]	.4	4.0	4.4	4.6
Windsor	.9	.5	.4	1.8	.9	.1	1.4	2.4	4.2
Total	83.3	5.3	7.4	96.0	9.6	3.5	103.0	116.1	212.1

[a] Counties with no production are omitted.
[b] Less than 50 cords.

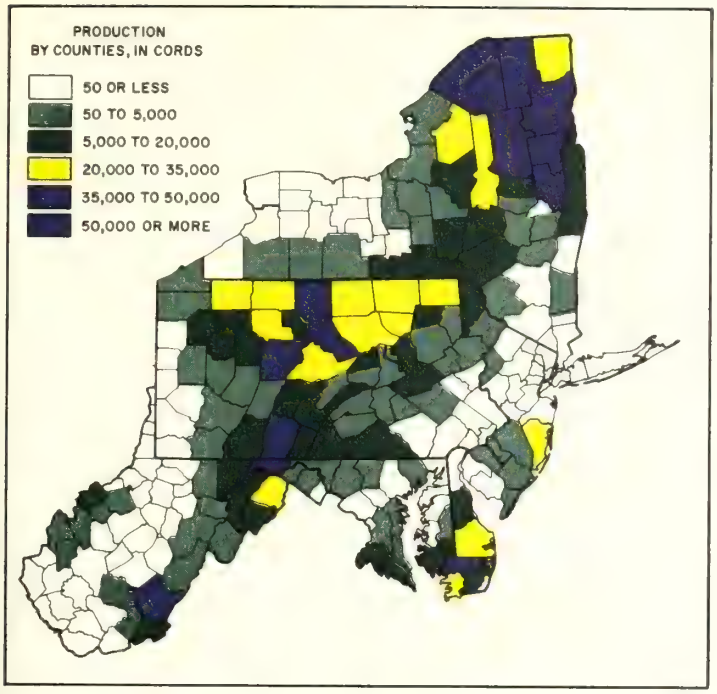


Figure 5.—Geographical pattern of pulpwood production from roundwood in the Middle Atlantic States, by county, 1978.

Table 13.—Pulpwood production from roundwood in New York, by county and selected species, 1978

(In thousands of standard cords)

County[a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Albany	0.7	—	2.7	3.4	—	—	—	—	3.4
Allegheny	—	—	—	—	0.3	—	0.4	0.7	.7
Broome	—	—	.1	.1	1.8	5.4	8.9	15.8	15.9
Cattaraugus	—	—	.5	.5	—	1.4	.2	1.6	2.1
Cayuga	.1	—	—	.1	.1	—	—	.1	.2
Chemung	—	—	—	—	1.1	1.2	4.3	6.6	6.6
Chenango	3.7	—	b	3.7	.2	.4	2.6	3.2	6.9
Clinton	2.7	0.8	9.1	12.6	2.7	6.0	11.5	20.2	32.8
Cortland	1.0	—	—	1.0	.4	—	—	.4	1.4
Delaware	1.3	—	—	1.3	.3	.9	4.9	6.1	7.4
Dutchess	—	—	—	—	—	—	1.9	1.9	1.9
Essex	3.0	6.0	5.3	14.3	6.9	2.3	61.0	70.2	84.5
Franklin	12.5	.5	22.1	35.1	1.0	18.5	30.0	49.5	84.6
Fulton	.3	1.4	1.7	3.4	.3	b	8.1	8.4	11.8
Greene	—	.1	b	.1	—	—	.3	.3	.4
Hamilton	6.6	5.2	1.0	12.8	3.4	2.9	56.0	62.3	75.1
Herkimer	5.3	.5	1.9	7.7	.3	.6	12.5	13.4	21.1
Jefferson	.7	—	.5	1.2	1.4	b	.8	2.2	3.4
Lewis	8.9	—	3.6	12.5	3.8	b	17.4	21.2	33.7
Madison	.9	—	.1	1.0	b	—	—	b	1.0
Montgomery	.1	—	.3	.4	.1	b	.1	.2	.6
Oneida	1.3	.1	2.1	3.5	.1	.1	4.2	4.4	7.9
Onondaga	—	—	—	—	b	—	.2	.2	.2
Oswego	b	—	.8	.8	.2	—	.7	.9	1.7
Otsego	.2	—	4.6	4.8	2.9	.3	.7	3.9	8.7
Rensselaer	—	1.3	.2	1.5	.6	.3	10.5	11.4	12.9

Continued

Table 13—Continued

County[a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
St. Lawrence	5.8	.2	14.8	20.8	.6	12.2	17.9	30.7	51.5
Saratoga	.3	7.2	7.8	15.3	4.1	.6	44.4	49.1	64.4
Schoharie	—	—	2.3	2.3	.2	.1	.8	1.1	3.4
Steuben	—	—	—	—	1.3	.5	.8	2.6	2.6
Sullivan	—	—	—	—	—	—	.3	.3	.3
Tioga	—	—	—	—	—	2.7	5.2	7.9	7.9
Ulster	—	—	—	—	—	—	b	b	b
Warren	—	9.9	4.4	14.0	5.0	.6	64.6	70.2	84.2
Washington	—	1.3	1.5	2.8	.4	.5	4.6	5.5	8.3
Total	55.4	34.5	87.3	177.2	39.5	57.2	375.8	472.5	649.7

[a]Counties with no production are omitted.

[b]Less than 50 cords.

Table 14.—Pulpwood production from roundwood in Pennsylvania, by county and selected species, 1978

(In thousands of standard cords)

County[a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Adams	—	—	—	0.7	—	5.0	2.0	7.0	7.7
Armstrong	—	—	—	—	—	.1	.1	.2	.2
Bedford	—	—	4.4	4.4	—	12.4	22.2	34.6	39.0
Berks	—	—	—	—	—	.7	.4	1.1	1.1
Blair	—	—	.6	.6	7.1	2.7	6.1	8.8	9.4
Bradford	—	—	—	—	—	6.2	16.8	30.1	30.1
Bucks	—	—	—	—	—	—	b	b	b
Butler	—	—	—	—	—	.2	.3	.5	.5
Cambria	—	b	.8	.8	—	—	1.3	1.3	2.1
Cameron	—	—	—	—	—	6.4	6.7	13.1	13.1
Carbon	—	—	b	—	.2	1.0	1.3	2.5	2.5
Centre	—	1.1	.1	1.2	.6	18.9	4.6	24.1	25.3
Clarion	—	—	—	—	—	3.0	2.3	5.3	5.3
Clearfield	—	2.3	2.9	5.2	.8	19.8	14.6	35.2	40.4
Clinton	—	.5	1.8	2.3	3.2	30.5	10.2	43.9	46.2
Columbia	—	—	—	—	.6	2.4	3.1	6.1	6.1
Crawford	—	—	—	—	—	—	.5	.5	.5
Cumberland	—	—	.2	.2	—	1.0	.5	1.5	1.7
Dauphin	—	—	b	b	.1	.3	.4	.8	.8
Elk	—	—	—	—	—	6.9	22.0	28.9	28.9
Erie	—	—	b	b	—	—	2.1	2.1	2.1
Fayette	—	—	.5	.5	—	—	1.0	1.0	1.5
Forest	—	—	—	—	—	9.5	9.4	18.9	18.9
Franklin	—	—	.3	.3	—	6.7	3.5	10.2	10.5
Fulton	—	—	3.4	3.4	—	3.1	3.1	6.2	9.6
Huntingdon	—	—	2.6	2.6	.3	7.7	5.9	13.9	16.5
Indiana	—	—	.1	.1	—	—	.7	.7	.7
Jefferson	—	—	—	—	—	4.2	9.0	13.2	13.2
Juniata	—	—	.9	.9	—	3.2	1.6	4.8	5.7

Continued

Table 14—Continued

County[a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Lackawanna	—	—	.2	.2	.4	1.5	2.2	4.1	4.3
Lancaster	—	—	—	—	—	—	[b]	[b]	[b]
Lebanon	—	—	—	—	[b]	.7	.4	1.1	1.1
Luzerne	—	—	[b]	[b]	.4	1.6	1.9	3.9	3.9
Lycoming	—	—	—	—	3.6	17.8	5.4	26.8	26.8
McKean	—	—	—	—	—	—	33.3	33.3	33.3
Mifflin	—	—	[b]	[b]	—	1.6	1.5	3.1	3.1
Monroe	—	—	.6	.6	[b]	1.5	.6	2.1	2.7
Montour	—	—	—	—	.2	.6	.8	1.6	1.6
Northampton	—	—	—	—	—	[b]	[b]	[b]	[b]
Northumberland	—	—	—	—	.1	.2	.3	.6	.6
Perry	—	—	.6	.6	[b]	1.3	.7	2.0	2.6
Pike	—	—	—	—	.3	3.1	.6	4.0	4.0
Potter	—	—	—	—	5.3	4.4	38.2	47.9	47.9
Schuylkill	—	—	.5	.5	.2	9.0	4.5	13.7	14.2
Snyder	—	—	[b]	[b]	—	.2	.1	.3	.3
Somerset	—	—	.1	.1	—	1.5	5.5	7.0	7.1
Sullivan	—	—	—	—	6.2	4.6	15.4	26.2	26.2
Susquehanna	—	—	—	—	4.1	5.4	23.9	33.4	33.4
Tioga	—	—	1.2	1.2	6.2	8.5	15.5	30.2	31.4
Union	—	—	.1	.1	.1	6.5	2.8	9.4	9.5
Venango	—	—	[b]	[b]	—	6.2	.5	6.7	6.7
Warren	—	—	—	—	—	14.2	16.0	30.6	30.6
Wayne	—	—	4.2	4.2	1.0	4.2	7.0	12.2	16.4
Westmoreland	—	—	—	—	—	—	.3	.3	.3
Wyoming	—	—	.1	.1	1.6	4.8	8.2	14.6	14.7
York	—	—	3.1	3.1	—	6.1	3.1	9.2	12.3
Total	—	3.9	30.0	33.9	42.6	257.8	340.4	640.8	674.7

[a] Counties with no production are omitted.
[b] Less than 50 cords.

Table 15.—Pulpwood production from roundwood in Delaware, Maryland, and New Jersey, by county and selected species, 1978

(In thousands of standard cords)

County[a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
DELAWARE									
Kent	—	—	4.6	4.6	—	0.2	2.0	2.2	6.8
Sussex	—	—	23.2	23.2	—	3.6	3.7	7.3	30.5
Total	—	—	27.8	27.8	—	3.8	5.7	9.5	37.3
MARYLAND									
Allegany	—	0.3	3.1	3.4	—	15.2	22.1	37.3	40.7
Anne Arundel	—	—	.8	.8	—	—	2.9	2.9	3.7
Baltimore	—	—	—	—	—	—	b	b	b
Calvert	—	—	1.7	1.7	—	—	—	—	1.7
Caroline	—	—	.3	.3	—	b	b	b	0.3
Carroll	—	—	2.8	2.8	—	.3	1.3	1.6	4.4
Charles	—	—	9.2	9.2	—	.2	4.0	4.2	13.4
Dorchester	—	—	8.1	8.1	—	b	b	b	8.1
Frederick	—	—	—	—	—	.3	.2	.5	.5
Garrett	—	.5	.7	1.2	—	8.0	6.5	14.5	15.7
Harford	—	—	.1	.1	—	1.2	—	1.2	1.3
Montgomery	—	—	b	b	—	—	b	b	b
Prince Georges	—	—	2.6	2.6	—	—	—	—	2.6
St. Marys	—	—	10.9	10.9	—	2.3	.4	2.7	13.6
Somerset	—	—	21.2	21.2	—	.3	.1	.4	21.6
Talbot	—	—	b	b	—	—	—	—	b
Washington	—	—	.7	.7	—	.4	1.2	1.6	2.3
Wicomico	—	—	39.1	39.1	—	2.8	1.3	4.1	43.2
Worcester	—	—	12.8	12.8	—	b	.1	.1	12.9
Total	—	0.8	114.1	114.9	—	31.0	40.1	71.1	186.0
NEW JERSEY									
Atlantic	—	—	0.8	0.8	—	—	0.2	0.2	1.0
Burlington	—	—	1.9	1.9	—	—	—	—	1.9
Camden	—	—	1.8	1.8	—	—	—	—	1.8
Cape May	—	—	1.6	1.6	—	—	.4	.4	2.0
Gloucester	—	—	1.6	1.6	—	—	.5	.5	2.1
Ocean	—	—	20.1	20.1	—	—	—	—	20.1
Warren	—	—	—	—	b	0.1	.1	.2	.2
Total	—	—	27.8	27.8	b	0.1	1.2	1.3	29.1

[a]Counties with no production are omitted.
[b]Less than 50 cords.

Table 16.—Pulpwood production from roundwood in West Virginia, by county and selected species, 1978

(In thousands of standard cords)

County[a]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Barbour	—	—	—	—	—	—	b	b	b
Berkeley	—	0.3	0.6	0.9	—	0.1	0.4	0.5	1.4
Boone	—	—	—	—	—	—	b	b	b
Braxton	—	—	—	—	—	—	b	b	b
Brooke	—	—	—	—	—	—	b	b	b
Cabell	—	—	.4	.4	—	—	b	b	b
Calhoun	—	—	b	b	—	—	—	—	—
Fayette	—	—	—	—	—	.8	.8	1.6	1.6
Grant	—	.2	1.2	1.4	—	4.0	14.1	18.1	19 5
Greenbrier	—	—	1.8	1.8	—	22.4	22.4	45.2	47.0
Hampshire	—	1.2	13.7	14.9	—	9.1	9.0	18.1	33 0
Hardy	—	.6	2.4	3.0	—	2.0	3.2	5.2	8.2
Harrison	—	—	b	b	—	—	b	b	b
Jackson	—	—	.5	.5	—	—	b	b	.5
Jefferson	—	—	b	b	—	—	b	b	b
Kanawha	—	—	b	b	—	—	—	—	b
Lewis	—	—	—	—	—	—	b	b	b
Lincoln	—	—	b	b	—	—	b	b	b
Mason	—	—	.4	.4	—	—	b	b	.4
Mineral	—	—	.7	.7	—	3.5	4.3	7.8	8.5
Mingo	—	—	—	—	—	—	b	b	b
Monroe	—	—	1.1	1.1	—	3.4	3.4	6.8	7.9
Morgan	—	.2	1.9	2.1	—	.2	.5	.7	2.8
Pendleton	—	—	.4	.4	—	1.0	1.5	2.5	2.9
Pleasants	—	—	—	—	—	—	b	b	b
Pocahontas	—	—	.4	.7	—	1.0	2.5	3.5	3.9
Preston	—	—	b	b	—	—	.7	.7	.7
Putnam	—	—	.7	.7	—	—	.2	.2	.9
Raleigh	—	—	b	b	—	b	b	b	b
Randolph	—	—	.5	.5	—	.6	1.4	2.0	2.5
Ritchie	—	—	.1	.1	—	—	b	b	.1
Roane	—	—	—	—	—	b	b	b	b
Summers	—	—	.1	.1	—	.1	.1	.2	.3
Taylor	—	—	—	—	—	—	b	b	b
Tucker	—	—	b	b	—	—	.7	.7	.7
Upshur	—	—	—	—	—	b	b	b	b
Wayne	—	—	b	b	—	—	b	b	b
Webster	—	—	b	b	—	—	—	—	b
Wirt	—	—	.1	.1	—	—	1.0	1.0	1 1
Wood	—	—	2.7	2.7	—	7.6	3.9	11.5	14.2
Total	—	2.5	29.5	32.2	—	55.8	70.5	126.3	158.5

[a]Counties with no production are omitted.
[b]Less than 50 cords.

☆U.S. GOVERNMENT PRINTING OFFICE: 1980-603-111/8

Headquarters of the Northeastern Forest Experiment Station are in Broomall, Pa. Field laboratories and research units are maintained at:

- **Amherst, Massachusetts, in cooperation with the University of Massachusetts.**
- **Beltsville, Maryland.**
- **Berea, Kentucky, in cooperation with Berea College.**
- **Burlington, Vermont, in cooperation with the University of Vermont.**
- **Delaware, Ohio.**
- **Durham, New Hampshire, in cooperation with the University of New Hampshire.**
- **Hamden, Connecticut, in cooperation with Yale University.**
- **Kingston, Pennsylvania.**
- **Morgantown, West Virginia, in cooperation with West Virginia University, Morgantown.**
- **Orono, Maine, in cooperation with the University of Maine, Orono.**
- **Parsons, West Virginia.**
- **Princeton, West Virginia.**
- **Syracuse, New York, in cooperation with the State University of New York College of Environmental Sciences and Forestry at Syracuse University, Syracuse.**
- **University Park, Pennsylvania, in cooperation with the Pennsylvania State University.**
- **Warren, Pennsylvania.**

ODC 923.9: (752)

CLEMSON UNIVERSITY LIBRARY
JUN 4 1980
SCI., TECH. & AGR. DIV.

GOVT. DOCUMENTS
DEPOSITORY ITEM
JUN 3 1980
CLEMSON
LIBRARY

THE FOREST-LAND OWNERS OF MARYLAND

by Neal P. Kingsley
and Thomas W. Birch

FOREST SERVICE RESOURCE BULLETIN NE-63
1980

FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE
NORTHEASTERN FOREST EXPERIMENT STATION
370 REED ROAD, BROOMALL, PA 19008

COVER PHOTO: Somerset County, south of Princess Anne

Abstract

Ninety percent of the commercial forest land in Maryland—2,280,000 acres—is in the hands of some 95,800 owners. Eighty-seven percent of these owners are individuals. The average individual owner is middle aged, well educated, relatively affluent, and from a rural or farm background. Twenty-two percent of the private owners have harvested timber from their land. These owners own 53 percent of the private woodland. Forty-seven percent of the owners intend to harvest timber from their land at some future date. They control 69 percent of the private woodland. Most owners show little interest in forestry practices. In fact, 12 percent of the owners have received some type of forestry assistance, but a majority of the owners do not know who to contact for forestry assistance. Twenty-six percent of the owners permit the public to use their woodland for recreation.

MANUSCRIPT RECEIVED FOR PUBLICATION 4 JANUARY 1980

The Authors

NEAL P. KINGSLEY, research forester, received a B.S. degree in forestry from the University of New Hampshire in 1961, and an M.S. degree in forest economics from the same university in 1963. He joined the Northeastern Forest Experiment Station in August 1962, and is now resource analysis team leader in the Experiment Station's Resources Evaluation work unit at Broomall, Pa.

THOMAS W. BIRCH, research forester, received a B.S. degree from Michigan State University in 1969, and an M.S. degree from Michigan State in March 1974. In June 1974, he joined the Northeastern Station's Resources Evaluation work unit as a resource analyst.

THE FOREST-LAND OWNERS OF MARYLAND

Contents

HIGHLIGHTS 1
INTRODUCTION 2
THE FOREST LAND AND ITS OWNERS . . 2
The individual forest-land owner 4
Corporate and other owners 6
WHY PEOPLE OWN FOREST LAND 6
HOW MUCH TIMBER IS AVAILABLE? 8
OWNER ATTITUDES ON TIMBER HARVESTING 10
Predicting owner behavior 10
Why owners harvest timber 12
Why some owners do not harvest timber . . . 13
SOME ASPECTS OF LAND MANAGEMENT ON PRIVATE COMMERCIAL FOREST LAND 14
Selection of harvested timber 14
Products harvested 15
Forestry assistance 15
Public use 16
LANDOWNER INTERESTS 16
CONSERVATION QUIZ 17
CONCLUSIONS 18
LITERATURE CITED 19
APPENDIX 20
Study method 20
Sampling errors 21
Definition of terms 22
Metric equivalents 23
Questionnaire 24
INDEX TO TABLES 36

HIGHLIGHTS

★ Ninety percent of the commercial forest land in Maryland—2,280,000 acres—is in the hands of some 95,800 owners.

★ The average size of private woodland ownerships is 23.8 acres. Fifty-five percent of the owners—52,600—own fewer than 10 acres but these owners control only 7 percent (169,800 acres) of the private commercial forest land.

★ Eighty-seven percent of the private owners are individuals.

★ The average individual owner is middle aged, well educated, relatively affluent, and from a rural or farm background.

★ Twenty-two percent of the private owners have harvested timber from their land and they own 53 percent of the private woodland.

★ Forty-seven percent of the owners intend to harvest timber from their land at some future date. They control 69 percent of the private woodland.

★ Twelve percent of the owners have received some type of forestry assistance but a majority of owners do not know who to contact for forestry assistance.

★ Twenty-six percent of the owners permit the public to use their woodland for recreation. The most commonly allowed recreational use was hunting.

INTRODUCTION

THE RECENTLY COMPLETED forest survey of Maryland (Powell and Kingsley 1980) provides estimates of the total area of forest land, the timber volume, and the area of forest land owned by broad categories of owners. However, the forest survey is not designed to provide estimates of the volume or acreage of timber that may be currently available for harvesting. Nor does it provide descriptions of typical forest-land owners, their reasons for owning forest land, or their attitudes toward timber harvesting, forest management, and the recreational use of their lands by the public.

This study is based on a mail canvass of 615 owners of privately held commercial forest land in Maryland. Most of these own land on which forest survey field plots were established. In addition to owners of forest survey plots, all owners who hold 500 acres or more of commercial forest land were sent questionnaries.

It is the intent of the authors to present the results of this study in a way that will facilitate their use in conjunction with the information provided in the forest resource report. THE USER OF THE DATA PRESENTED IN THE APPENDIX OF THIS REPORT IS STRONGLY ADVISED TO READ THE DEFINITIONS OF TERMS, THE DISCUSSION OF STUDY METHODS, AND THE DISCUSSION OF SAMPLING ERRORS PRESENTED IN THE APPENDIX.

THE FOREST LAND AND ITS OWNERS

The 2,280,000 acres of privately owned commercial forest land in Maryland are held by an estimated 95,800 owners. Thus, the average Maryland forest-land owner holds nearly 24 acres of forest land. However, the average size of holding varies substantially from one geographic unit to another (Fig. 1).

Figure 1.—Relative distribution of private forest-land owners and private commercial forest land in the geographic units.

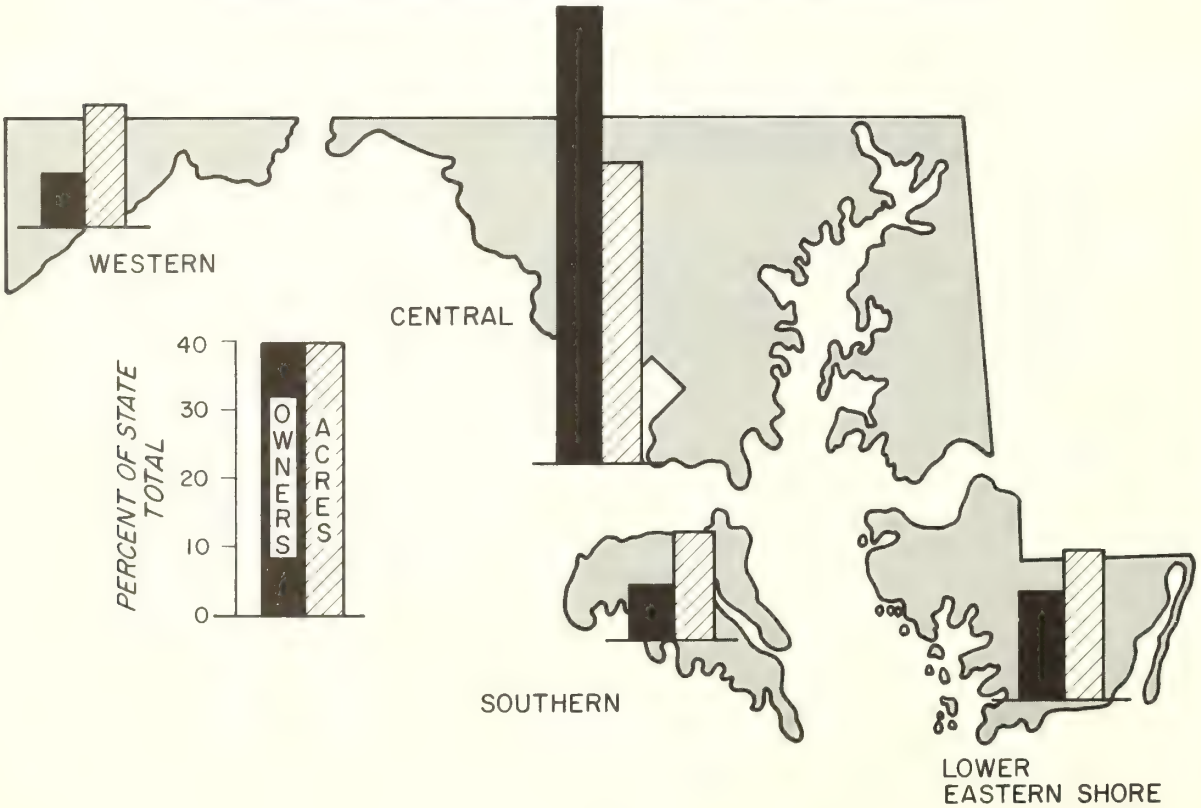
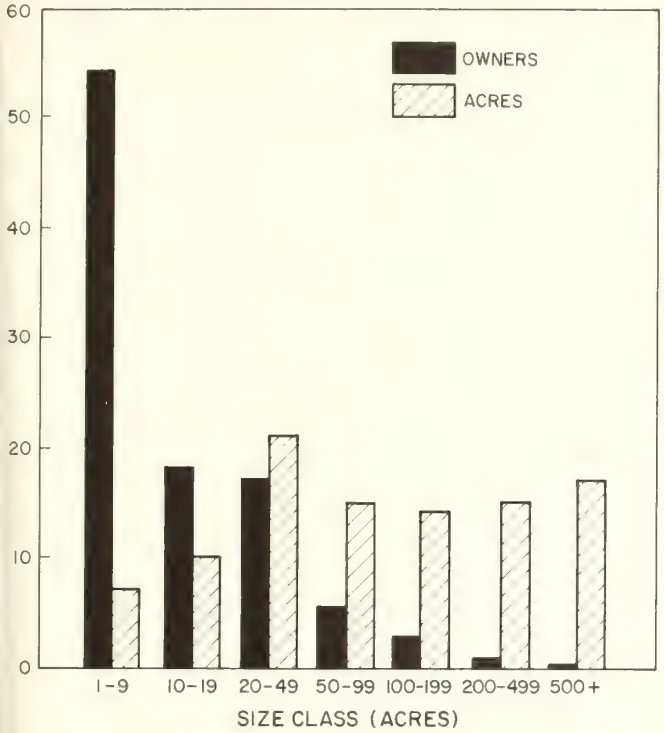


Figure 2.—Distribution of private ownerships, by size, class of forest holding and percentage of owners and acreage.



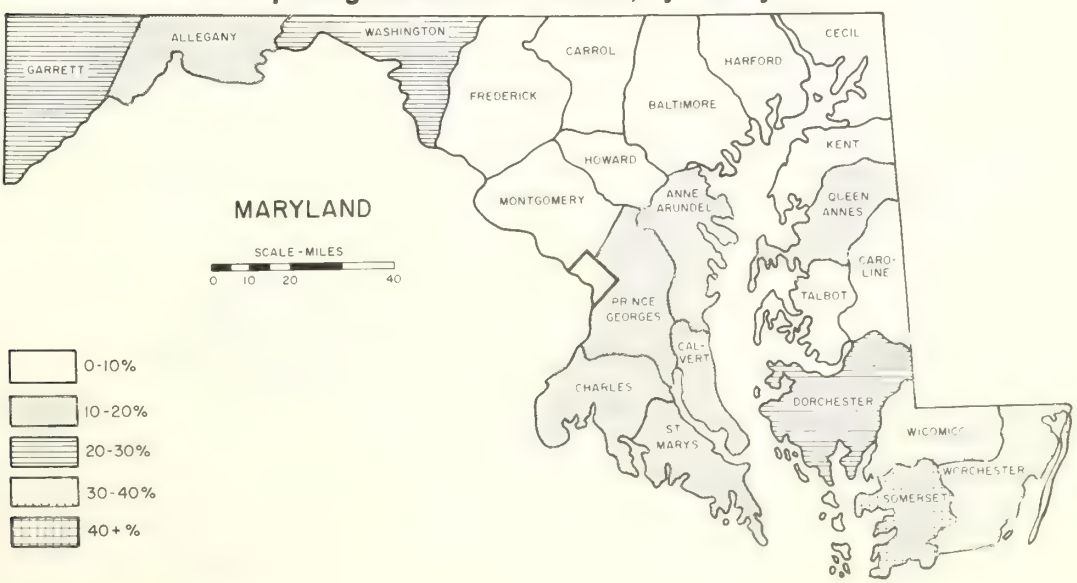
In the most densely populated Central geographic unit, the average owner holds just under 16 acres, while in the more rural Western geographic unit the average ownership is just over 50 acres.

Of the 95,800 forest-land owners in the state, 52,600—55 percent—hold fewer than 10 acres (Fig. 2). In total, these owners hold only 7 percent of the privately owned commercial forest land in the state. Such small tracts are seldom looked upon as a source of timber. The continued fragmentation of forest land into essentially oversized house lots could pose a deterrent not only to timber management. but also to comprehensive land planning and management.

When we remove those owners with fewer than 10 acres from consideration, the average size of holding increases markedly to nearly 50 acres statewide and to more than 74 acres in the Lower Eastern Shore geographic unit. Only an estimated 1,400 forest-land owners in Maryland own 200 acres or more. However, these owners hold 732,800 acres of forest land in the state.

As mentioned earlier, owners of 500 acres or more of commercial forest land in Maryland were enumerated rather than sampled. There are more than 200 of these owners and they hold a total of 389,500 acres. Most large ownerships are concentrated in the Lower Eastern Shore unit (Fig. 3). Several of these

Figure 3.—Percentage of private commercial forest land in ownerships of greater than 500 acres, by county.



large ownerships are held by forest-based industries that require large tracts of land to sustain their operations. Other large ownerships are concentrated in the western three counties. Through most of central Maryland large tracts of forest land are rare.

The individual forest-land owner

Individuals hold 72 percent of the privately owned commercial forest land in Maryland (Fig. 4). These 83,100 hold 1,642,100 acres. People who own forest land in Maryland are relatively young to middle aged, well educated, affluent, and usually have a rural background. One of three is under the age of 45 and nearly three of four are under 65. Nearly two of five have more than a high school education. Two of five also have incomes over $15,000 per year. And over half spent the first 12 years of their lives on a farm or in a rural area.

One in five Maryland owners is employed in a skilled trade (Fig. 5). Retired people make up 16 percent of the forest-land owning population. White collar workers account for 14 percent and professionals and executives, 19 percent. Farmers account for 13 percent, but they hold more forest land than any other group—25 percent.

Just as Maryland is a heterogeneous state in land forms and land uses, so, too, the profile of forest-land owners differs from one region of the state to another. In the Western geographic unit, 81 percent of the individual owners are under 65. But in the Lower Eastern Shore unit, only 54 percent are under that age. Also, in the Lower Eastern Shore unit only 15 percent of the owners have more than a high school education, while in the Southern unit 52 percent do. Statewide, 41 percent of Maryland owners have incomes in excess of $15,000, but only 7 percent in the Western unit have incomes over $15,000. Only 45 percent of the owners in the Central unit have rural or farm backgrounds. This is to be expected since the Central unit is the most urbanized and industrialized geographic unit. Conversely, the most rural area, the Lower Eastern Shore, has the highest proportion of owners with rural backgrounds—86 percent. In the Lower Eastern Shore unit, one in five owners is a farmer. This region also has the highest proportion of retired owners with 31 percent. In the other geographic units, either skilled workers or white collar workers account for the largest occupation groups.

Figure 4.—Percentage of all owners and acreage of privately owned commercial forest land, by form of ownership.

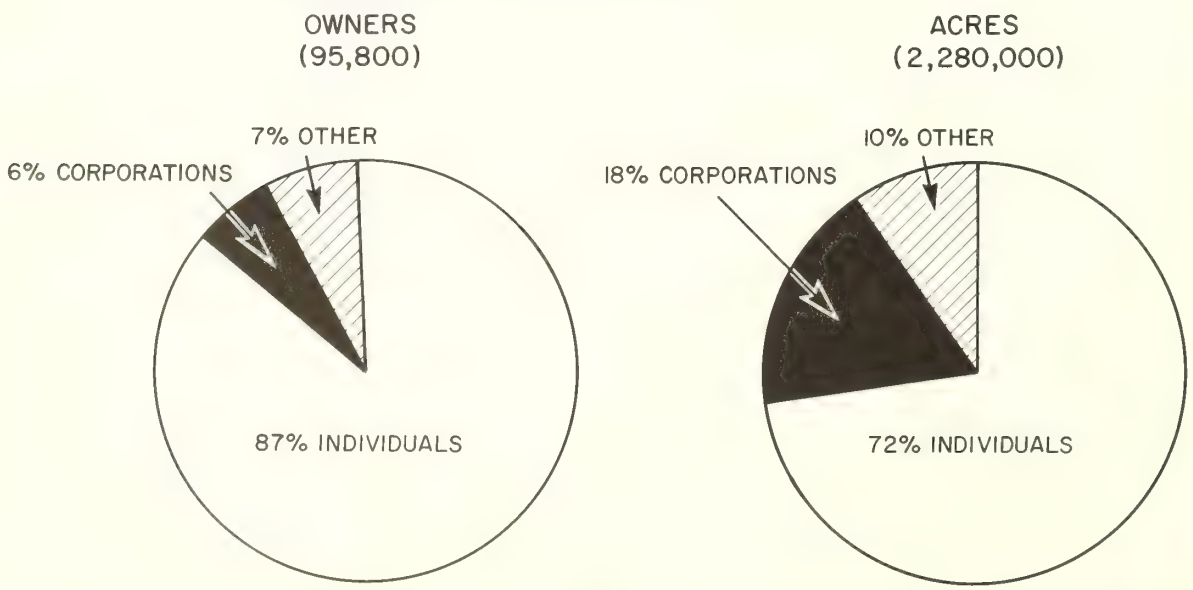
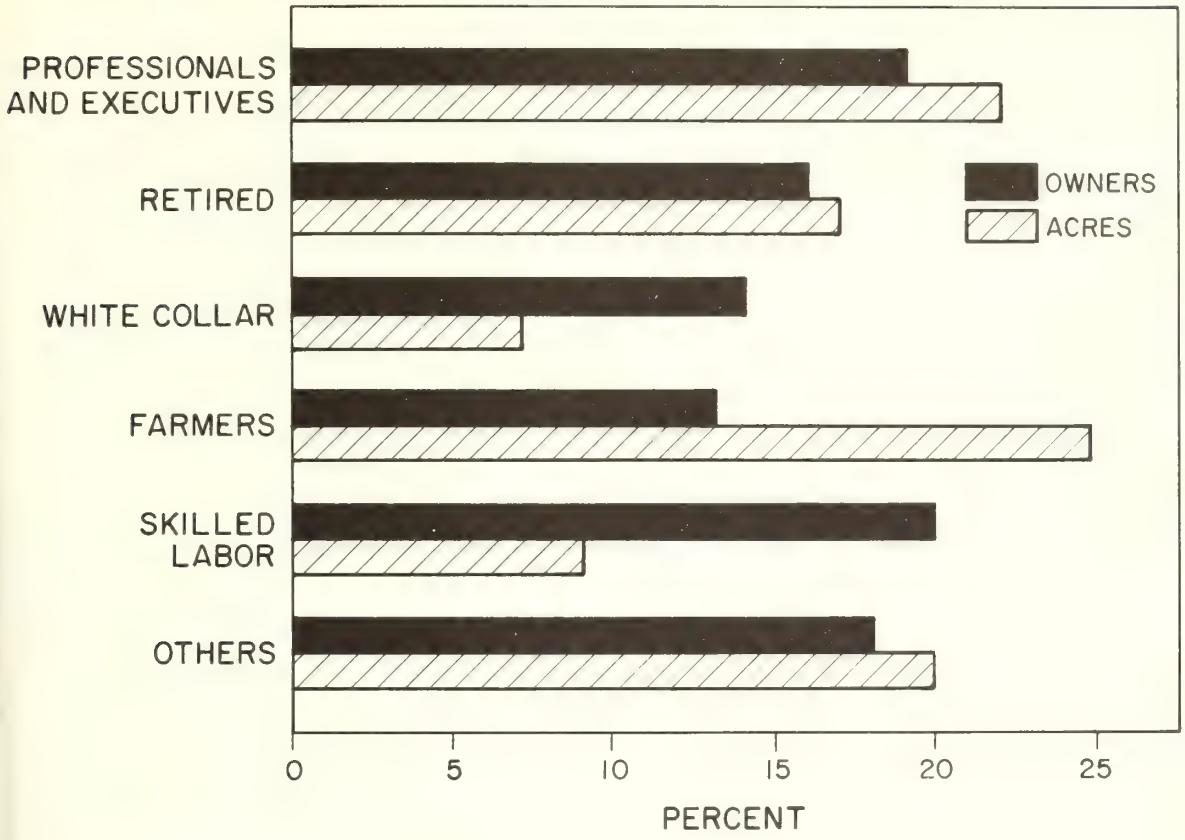


Figure 5.—Owner occupations, by percentage of owners and acreage.



Profiles of Individuals Owning Commercial Forest Land in Maryland

Item	*Central*	*Southern*	*Lower Eastern Shore*	*Western*	*Total*
Age (under 65)	78%	75%	54%	81%	74%
Education (Beyond high school)	43%	52%	15%	24%	38%
Income ($15,000+)	51%	56%	13%	17%	41%
Background	45% rural or farm	66% rural or farm	86% rural or farm	76% rural	57% rural
Occupation	23% skilled labor 10% farmer	23% white collar 18% farmer	31% retired 20% farmer	23% skilled labor 17% farmer	20% skilled labor 13% farmer

Other factors that help describe the owners relations to their land are tenure of ownership and distance from tract. Forty-seven percent of the individual owners have owned their land for fewer than 10 years; 29 percent, 10 to 24 years; and 18 percent, over 25 years. Most owners own only one tract and live on it or within 1 mile of it.

Corporate and other owners

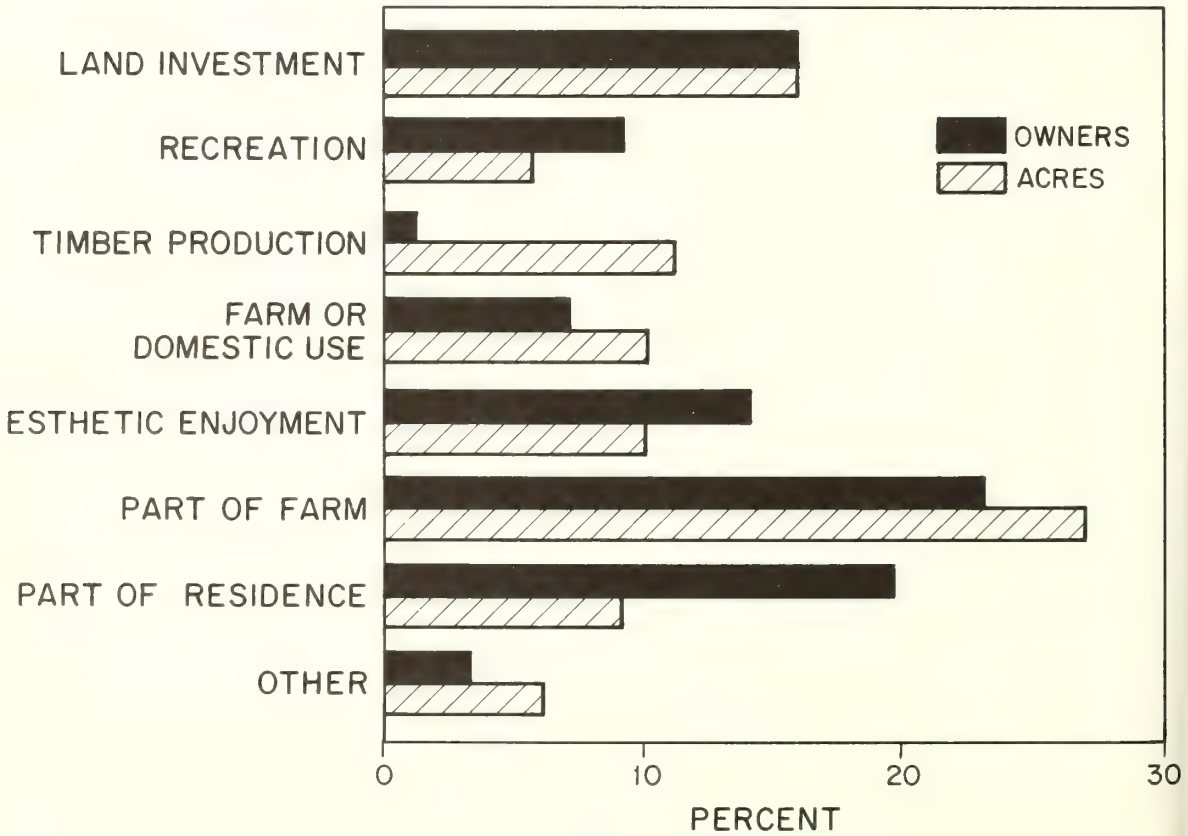
An estimated 6,200 corporations of various types hold 417,400 acres of commercial forest land in Maryland. Corporations engaged in real estate hold 132,700 acres and number 1,600. Corporations engaged in timber-based industries, while numbering fewer than 50, hold 107,600 acres. Nonindustrial business corporations, such as banks, insurance companies, and merchandisers—while accounting for more than half of all corporate owners—hold only 35,700 acres. The remaining 141,400 acres of forest land held by corporations is held by corporate farms, nonforest industries, and other corporations.

An estimated 3,600 partnerships hold 126,100 acres of Maryland's privately held commercial forest land. The remaining 94,400 acres are owned by clubs, associations, trusts, undivided estates, and other groups and organizations.

WHY PEOPLE OWN FOREST LAND

Maryland owners were asked to rank eight reasons for owning forest land. These included land investment, recreation, timber production, farm or domestic use, esthetic enjoyment, part of farm (but serves no useful function in the farm operation), part of residence, and "other" (Fig. 6). Nearly one in four owners ranked "part of the farm" as the most important reason for owning forest land. Being part of the residence was ranked most

Figure 6.—Primary reason for owning forest land, by percentage of owners and acreage.



important by one owner in five. These two groups control 36 percent of the privately owned commercial forest land in the state. Thus, more than one-third of Maryland's private commercial forest land is held by owners who apparently have no planned use for the land. With no firm ownership objective in mind, such owners are highly unlikely to manage their land for any purpose.

Land as an investment was the third most often stated reason for owning forest land. These people account for 16 percent of the owners and they hold 16 percent of the private commercial forest land. The investment motive appears to be more important in the Lower Eastern Shore unit than anywhere else in the state. In that unit, 22 percent listed investment as the most important reason. However, these owners hold somewhat smaller than average tracts since they account for only 17 percent of the unit's private commercial forest land.

Another commonly expressed reason for holding forest land in Maryland is the esthetic enjoyment of it. Fourteen percent list this as the number one reason for holding forest land. These owners, however, own only 10 percent of the forest land.

Timber production is the least commonly stated primary reason for owning forest land in Maryland. Only 2 percent would list this reason first. These owners hold 12 percent of Maryland's privately owned commercial forest land. While the percentage of owners who indicate timber production as the primary reason for owning forest land varies only slightly from one geographic unit to another, the area of land varies significantly. In the Lower Eastern Shore unit, the major timber producing region of the state, 31 percent of the forest land is held by the 2 percent who listed timber production as their primary reason for owning forest land. Conversely in the Central unit, the region where timber production is least significant, only 4 percent of the privately owned commercial forest land is held by such owners.

An estimated 37,100 Maryland forest-land owners would list a second reason for owning forest land. Apparently 53,000 owners would not be able to think of a reason for owning forest land other than the one they listed as their primary reason. Of the estimated 37,100 who would list a second reason, 25 percent would list recreation and 25 percent farm or domestic use as the second reason for owning forest land. An additional 19 percent would list esthetics and 14 percent would indicate part of the residence.

Only 7 percent of the 37,200 owners—2,700—would indicate timber production as their second reason for owning forest land. These owners hold 157,600 acres of commercial forest land. Combining these owners with those indicating timber production as their most important reason for holding forest land gives a total of 4,300 owners—5 percent. These two groups hold a combined total of 426,000 acres. Thus, 18 percent of the private commercial forest land in Maryland is held by owners who consider timber production a motive for owning forest land. Excluding the corporate forest industry lands, we find that only 14 percent in private nonforest-industry ownership is held with timber production in mind.

Owners were also asked to list the most important benefits they have derived from their forest land over the past 5 years and the most important expected benefit in the coming 5 years. Esthetic enjoyment was the most frequently mentioned benefit that owners derived over the past 5 years. Statewide, 31 percent of the owners holding 24 percent of the private commercial forest land listed this benefit as the most important one they had received. Esthetic enjoyment was the front runner among benefits in all geographic units except in the Lower Eastern shore. In this unit, 25 percent—holding 30 percent of the private commercial forest land—listed the increase in the value of land as the most important benefit.

Farm or domestic use as a benefit received in the last 5 years ranked second among owners followed by increase in land value, recreation, timber production, and all other reasons combined. Increase in the value of land ranked behind esthetic enjoyment, accounting for 23 percent of the acreage. Farm or domestic use accounts for 18 percent of the private forest land; timber production, 14 percent; recreation, 8 percent; and other, 4 percent.

Looking to the future, 41 percent of Maryland's owners expect esthetic enjoyment to be the most important benefit during the coming 5 years. These owners hold 23 percent of the privately held commercial forest land. In the Lower Eastern Shore unit, the increase in land value led the list of expected future benefits. In this unit, 48 percent listed land value increase as the most important expected benefit and they hold 31 percent of the private forest land in the unit. Statewide, the increase in land value was the second most frequently listed benefit expected. Twenty-one percent of the owners in the state listed increase in land value as most important. These owners hold 26 percent of the land. Only 16 percent expect farm or domestic use to be most important. These owners hold 7 percent of the land. As many owners—3 percent—said they expect timber production to be the most important benefit in the coming 5 years as those who said it was the most important over the past 5 years. These owners hold 13 percent of the forest land. Over half of this acreage is in the Lower Eastern Shore unit, where nearly one third of the land is held by owners who expect income from timber to be important in the next 5 years.

HOW MUCH TIMBER IS AVAILABLE?

How much of the timber on privately owned commercial forest land is available for harvesting? The answer is influenced by how one defines availability and the assumptions that are used to develop the estimate. The usefulness of the resulting estimate is also limited to the time period in which it is made. Industrial developments, market conditions, and other social and economic factors can drastically alter those factors that interact to determine how much timber will be made available. However, by examining the future intentions and past practices of forest-land owners, we can get an idea of how much forest land in Maryland would be made available for cutting.

An estimated 47 percent—44,900—of the current forest-land owners in Maryland intend to harvest timber from their land sometime. These owners hold nearly 1.6 million acres—69 percent—of the privately held commercial forest land in the state. This land contains an estimated 2.2 billion cubic feet of growing stock and has an average annual net growth of 71.5 million cubic feet per year. However, only 7,700 owners have firm enough intentions to harvest that they can say they plan to harvest during the next 10 years. These owners hold only 619 thousand acres with an estimated 887 million cubic feet of growing stock and a net annual growth of 30 million cubic feet. Thus, there appears to be a considerable gap between those owners with firm intentions to cut and those who are "entertaining" the thought of cutting timber. Obviously, many owners hold tracts that are too small for timber production; others have timber of too poor quality or have species for which there is very little demand. Still other owners may place such stringent restrictions on harvesting that a willing buyer cannot be found.

We now have an indication of what Maryland owners say they intend to do. How does this compare with what they have done? Of the current owners of forested land in Maryland, an estimated 21,100—22 percent—have harvested timber from their land. These owners hold 1.2 million acres with an estimated volume of 1.7 billion cubic feet of growing stock and an estimated 55.2 million cubic feet of net growth annually.

Now we have a range of possible available volume and an indication, based on past performance, of what we may expect landowners to do. The following shows these estimates based on past cutting, intention to cut during next 10 years, and intention to cut someday for each geographic unit and for the state as a whole.

Available Volume Under Different Assumptions, by Geographic Unit

Item	*Central*	*Southern*	*Lower Eastern Shore*	*Western*	*State*
Average volume per acre (private land) (ft^3)	1496.2	1319.5	1644.8	824.3	1381.6
Growth per acre (ft^3)	45	45	62	22	44
Have cut:					
Acres owned (thousand)	431.5	211.7	345.8	221.9	1210.9
Volume (million ft^3)	645.6	279.3	568.8	182.9	1676.6
Annual growth (million ft^3)	19.4	9.5	21.4	4.9	55.2
Cut next 10 years:					
Acres owned (thousand)	227.0	66.8	232.6	92.8	619.2
Volume (million ft^3)	339.6	88.1	382.6	76.5	886.8
Annual growth (million ft^3)	10.2	3.0	14.4	2.0	29.6
Next 10 years + Indefinite:					
Acres owned (thousand)	657.6	252.2	397.5	273.5	1581.2
Volume (million ft^3)	983.9	332.8	661.6	225.8	2184.6
Annual growth (million ft^3)	29.6	11.3	24.6	6.0	71.5

There is yet another way to look at the question of availability of timber from privately owned forest land. This we might call the sustainable average annual removal. If we assume that all of the owners who express a willingness to harvest made available a combined volume equal to the average net annual growth on all lands held by these owners, we could expect that 71.5 million cubic feet could be made available. In theory, this volume could be harvested annually in Maryland from lands held by owners expressing a willingness to harvest without depleting the growing stock on these lands.

In 1975, an estimated 58.9 million cubic feet of growing stock was removed from commercial forest land in Maryland. Of this total an estimated 57.1 million was removed from privately held commercial forest land. According to this analysis, Maryland forestland owners in 1975 made available 14.4 (71.5 minus 57.1) million cubic feet more than was removed.

If, however, we look at the trend of timber removals for the 1964-1975 decade we see that 1975 was not typical of the period. If 1975 had been consistent with the trend, a total of about 83.6 million cubic feet would have been removed from private commercial forest land. Thus, it would appear that in a normal year the available annual growth on private forest land in Maryland would be 9 percent less than is demanded by the market. The following shows this analysis, by geographic unit for 1975 based on the trends from the forest survey. Note that this analysis indicates that there is severe overcutting on a trend-level basis in the Western Unit.

Estimated Available Growth Versus Estimated Timber Removals From Private Forest Land

Geographic unit	*Net growth*	*Removals*	*Surplus or deficit*
	Million ft^3		
Central	29.6	28.8	+0.8
Southern	11.3	14.8	-3.5
Lower Eastern Shore	24.7	22.5	+2.2
Western	6.0	16.7	-10.7
Total	71.6	82.8	-11.2

In the Southern unit, growth equals about 76 percent of removals. In the Central unit growth and removals are nearly in balance. In the Lower Eastern Shore there appears to be a modest surplus of growth. One reason for the apparently severe imbalance of growth and removals in the Western unit is that in this region the realized annual net growth is only 22 cubic feet per acre per year.

This analysis indicates that Maryland is currently harvesting timber from private forest land at a rate that cannot be sustained by the annual net growth on land held by owners who would harvest timber. Thus, the problem appears to be how to make more timber available on a sustainable basis. There are three possible ways to do this:

1. Utilization—Nearly 20 million cubic feet of growing stock were removed in 1975 and apparently not used for products. Much of this material could have been used, particularly for fiber products.

2. Forest Management—Most of the non-forest industry land in Maryland is essentially unmanaged. Forest management could substantially increase growth on these lands, thus, producing more timber from the same land base.

3. Encouraging More Owners to Harvest—Nearly 700,000 acres of private commercial forest land in Maryland are held by owners who have no intention of ever harvesting timber. Many of these owners could be encouraged to manage and harvest their timber.

It should be pointed out that because the present owner of a tract of forest land has no intention to harvest does not mean that the timber on the land will never be harvested. In a state like Maryland, land is constantly changing hands. In fact, 59 percent of the private commercial forest land in the state has been held by the same owners for fewer than 25 years. Further, what an owner says he intends to do and what he does are often very different. Research in Delaware indicates that the percentages of owners who intend to cut or not cut at any point in time are about the same (Turner et al. 1977). However, owners are very inconsistent about their intentions and few gave the same response on both occasions.

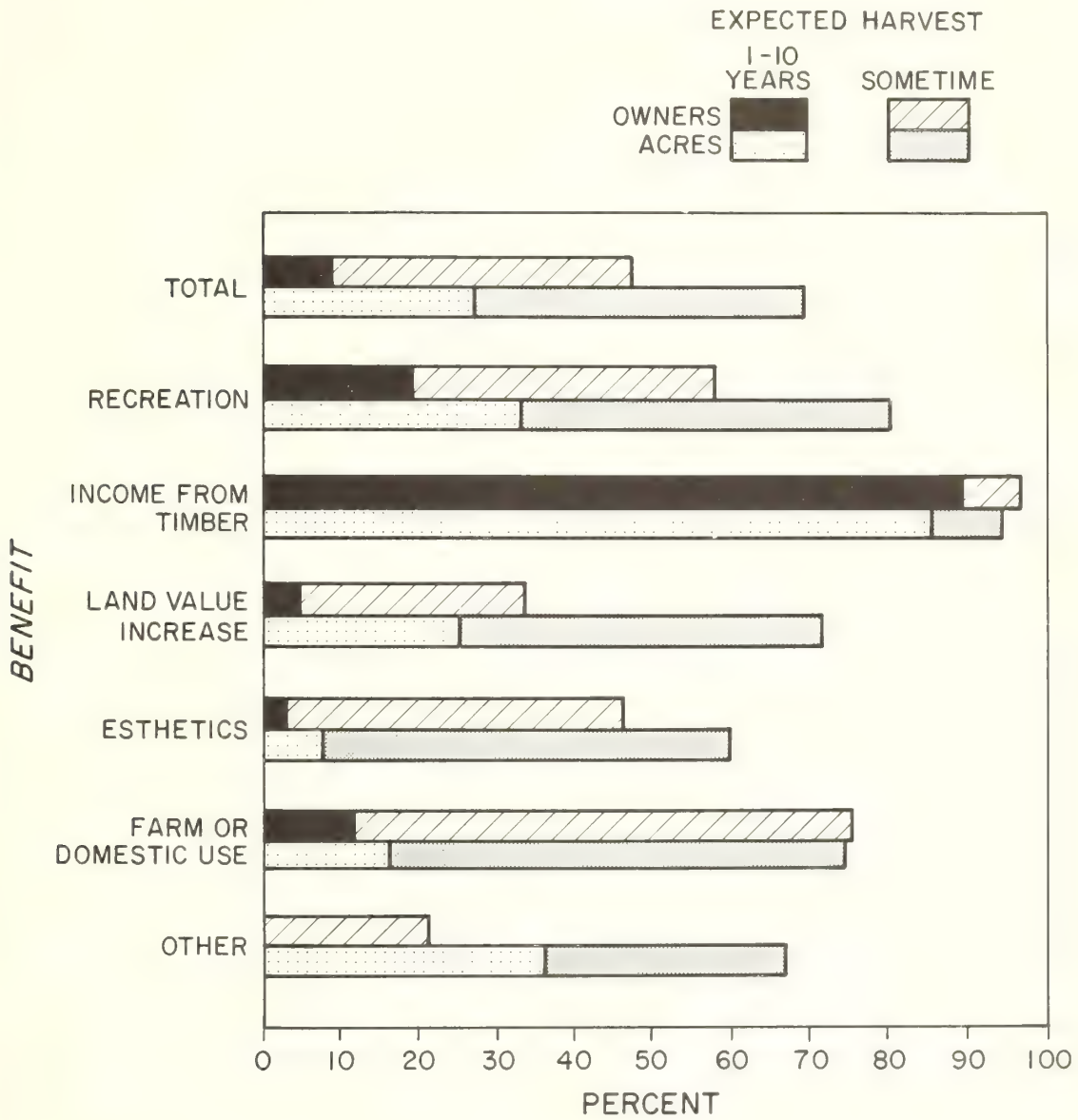
OWNER ATTITUDES ON TIMBER HARVESTING

Predicting owner behavior

Previous studies (Kingsley 1976; Kingsley and Birch 1977; Birch and Kingsley 1978; Birch and Powell 1978) indicate that attitudes on the following three areas consistently identify potential timber harvesters; primary benefits expected in the next 5 years, size of forest ownership, and primary reason for owning woodland.

A high proportion of owners (89 percent) who expect income from the sale of timber to be the primary benefit from owning forest land during the next 5 years intend to harvest timber during the next 10 years (Fig. 7). The remaining 11 percent said they intended to harvest at some time or did not answer the question on intention to harvest. If we look at owners who have definite or indefinite intentions to harvest, then at least 50 percent of those owners who expect benefits of farm or domestic use and recreation also expect to harvest timber. Even when less than 50 percent of the owners in an expected benefit group intend to harvest at some time, over 50

Figure 7.—Percentage of owners and acreage owned, by expected time of harvest and primary benefit expected in the next 5 years.



percent of the land in the group is owned by those who intend to harvest because these are owners of larger tracts. This ties in very closely with our second prediction question of size of forest ownership.

As might be expected, the more forest land an owner holds the more likely he is to harvest timber. Owners who plan to harvest within the coming decade hold an average of 78 acres. Those who are indefinite about future harvests own an average of 26 acres. And owners who say they never plan to harvest own an average 12 acres. Looking at past performance, those who have cut timber own an average of 57 acres, while those who have never harvested own an average of 14 acres.

When we look at intention to harvest within our seven size classes of ownership,

Figure 8.—Percentage of owners and acreage owned, by expected time of harvest and size class of ownership.

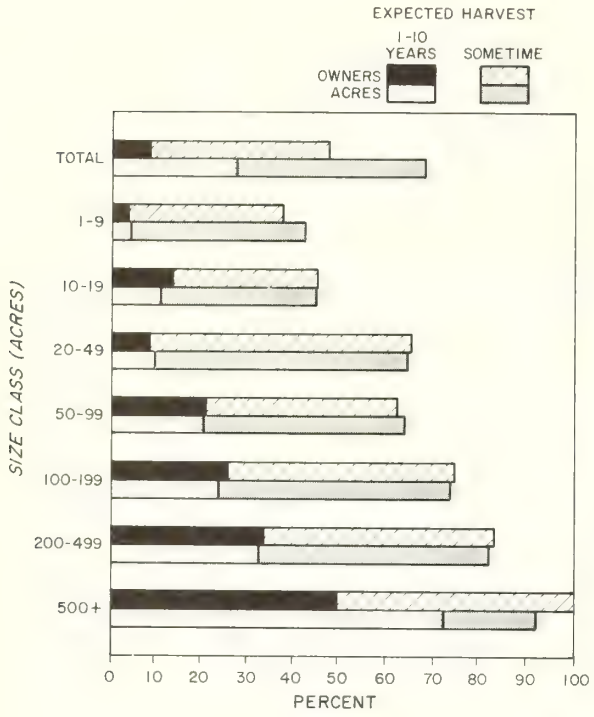
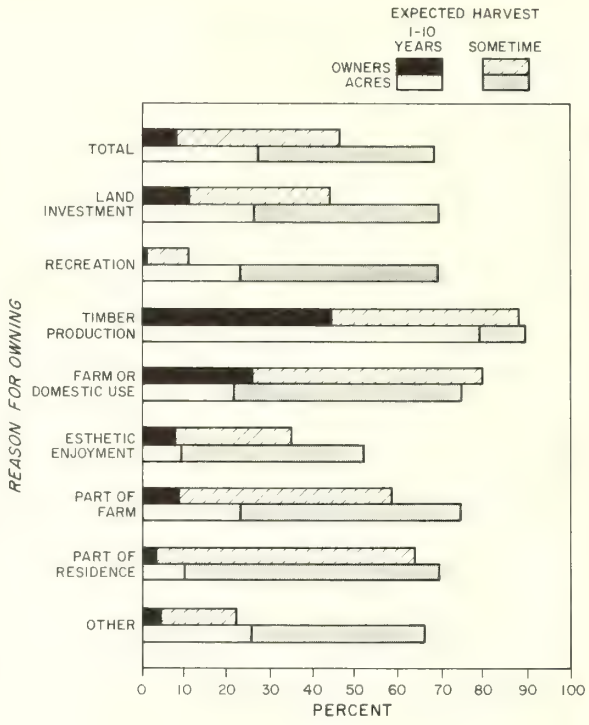


Figure 9.—Percentage of owners and acreage owned, by expected time of harvest and primary reason for owning forest land.



we see very clearly the predictive power of this question (Fig. 8). Fewer than 50 owners who own 500 or more acres of commercial forest land do not intend to harvest timber. Among ownerships of fewer than 20 acres, less than 50 percent of the owners within these classes intend to harvest timber. In the four classes between 50 and 500 acres, more than 60 percent of the owners intend to harvest sometime, but no more than 33 percent have definite plans to harvest in the next 10 years.

The third predictor of harvesting intentions is primary reason for owning forest land (Fig. 9). In no category of primary reason for owning forest land do 50 percent of the owners have intentions of harvesting in the next 10 years. When we include those owners with indefinite intentions to harvest only the land investment, esthetic enjoyment and "other" categories have less than 50 percent of the owners that intend to harvest.

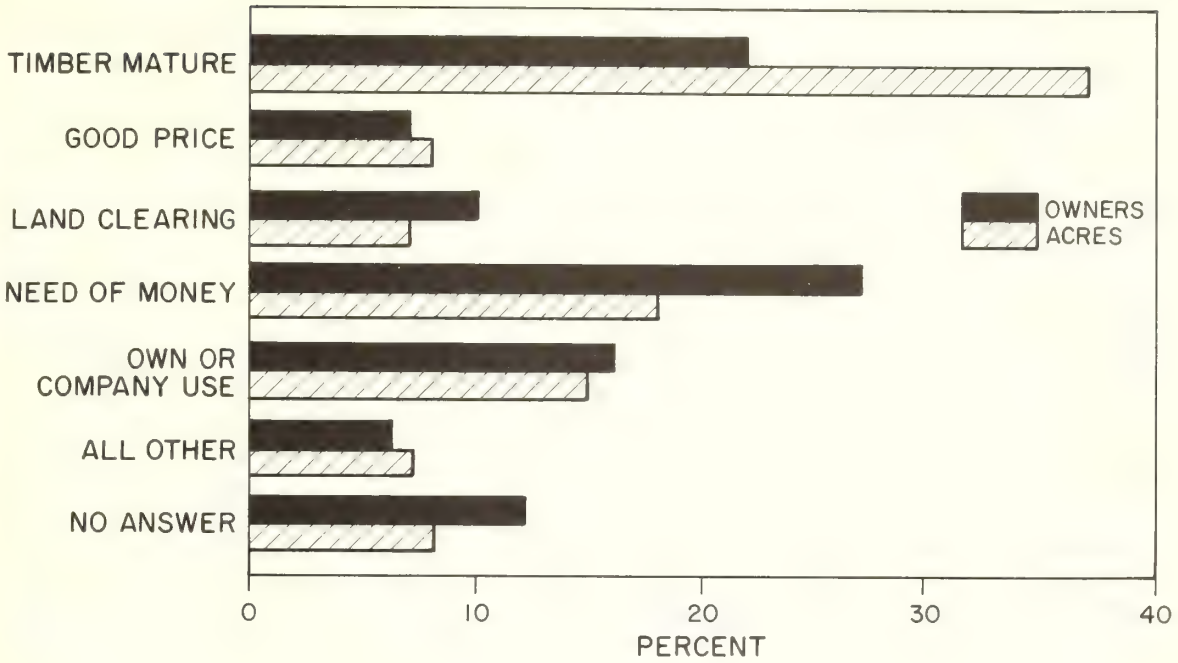
It should be noted that some owners who say they own forest land for timber production never intend to harvest timber. This seeming inconsistency is possible in situations where the owner is interested in timber production but knows that he will pass the land on to his heirs before the next harvest.

In looking at all three variables, it seems that timber producers have a broad range of reasons for owning timber and benefits they expect from their land. But the common thread that ties together the owners who expect to harvest is the more forest land an owner has the more likely he will harvest timber.

Why owners harvest timber

An estimated 21,100 of the current owners of private commercial forest land in Maryland have harvested timber from their lands. These owners account for 22 percent of all the

Figure 10.—Reasons for harvesting timber, by percentage of owners and acreage.



owners in the state. However, they hold a total of 1,210,900 acres or 53 percent of the privately owned commercial forest land in the state.

More Maryland owners—27 percent of those who have harvested—harvested timber because they needed the money than because of any other reason (Fig. 10). These owners hold 220,000 acres—18 percent of the total held by past harvesters. Another 22 percent of those owners who have harvested did so because they believed the timber was mature. These owners, however, own more forest land than any other group—449,500 acres or 37 percent of the land held by harvesters. Sixteen percent of the owners who harvested said they did so for their own use or for company use. These owners hold 15 percent of the land held by past harvesters.

Land clearing is often mentioned as a major reason for harvesting in Maryland; 10 percent of those owners who have cut timber from their land did so in clearing land. However, these owners hold only 7 percent of the land held by past harvesters. Often, these people are farmers who harvested timber incidental to enlarging a field or straightening the edges of fields. Perhaps Maryland forest-land owners are not happy with the selling prices of timber. Only 7 percent of those who have harvested said they did so because they were offered a good price. These owners hold 8 percent of the land owned by past harvesters.

The conclusion that most privately owned commercial forest land in Maryland is essentially unmanaged is reinforced by the fact that less than 1 percent of the owners who harvest said they did so as part of a cultural treatment of their stands. And these owners hold only 16,200 acres, about 1 percent of the land owned by past harvesters. Only 2 percent of the owners who harvested said they did so to salvage diseased or damaged timber. These owners hold 4 percent of the acreage owned by past harvesters. This is an interesting finding in view of the outbreak of the southern pine bark beetle *(Dendroctonus frontalis)* in the Lower Eastern Shore unit in recent years.

Why some owners do not harvest timber

Seventy-eight percent—74,700—of the owners of privately held commercial forest

land in Maryland have never harvested timber from their land. Nearly one fourth of the land—245,800 acres—held by nonharvesting owners have not been harvested because the owner considers the timber immature (Fig. 11). Another important reason for not harvesting in Maryland is that many owners believe that harvesting would ruin the scenery. An estimated 17 percent of the owners who have not harvested would give this reason. These owners hold 21 percent of the land held by nonharvesters. Concern over the possible ruin of scenery is highest in the Western unit, where 29 percent of the owners gave this reason for not harvesting. Twelve percent of the nonharvesting owners say that they have not harvested timber for fear that hunting values of the land would be destroyed. However, these owners hold fewer than 5 acres of forest land each.

Very few Maryland forest-land owners are philosophically opposed to cutting. Only 2 percent of the owners who have not harvested said they have not because they are opposed to harvesting. These owners account for 2 percent of the land held by nonharvesters.

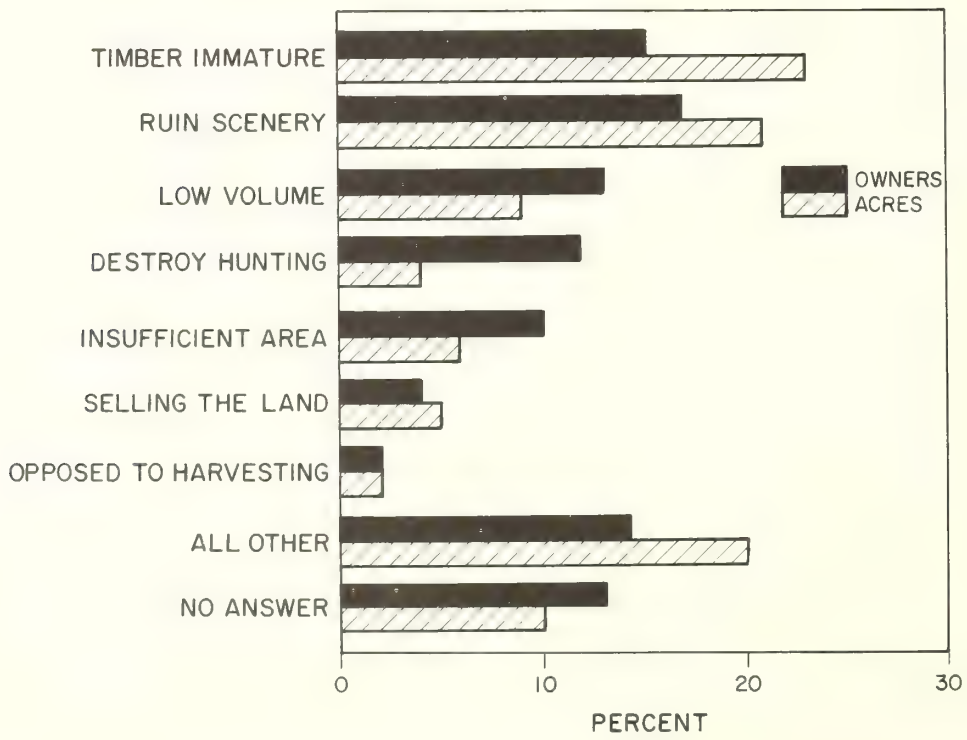
SOME ASPECTS OF LAND MANAGEMENT ON PRIVATE COMMERCIAL FOREST LAND

Selection of harvested timber

Nearly one-third of the owners who have harvested timber in Maryland stated that they, the landowners, were the ones who decided which area would be cut or how trees would be chosen for harvest. These owners control 401,800 acres or 33 percent of the land held by harvesters. An estimated 30 percent of the owners who harvested allowed the buyer to choose the area or trees to be cut. These owners tend to hold somewhat smaller than average tracts as they account for 24 percent of the land held by harvesters.

An estimated 12 percent of the owners who have harvested had a forester choose the

Figure 11.—Reasons for not harvesting timber, by percentage of owners and acreage.



area or trees to be harvested. These owners hold 19 percent of the land held by harvesters. An additional 7 percent of those who harvested said that they, the landowner, and a forester jointly chose the timber.

The diameter-limit method seems the most widely used method of selecting trees to be cut. An estimated 28 percent of the owners who have cut said this was the method used. They account for 28 percent of the land held by harvesters. The second most common method was individual-tree selection, used by 22 percent of the owners who have cut. Individual-tree selection is apparently most popular with owners of slightly smaller than average tracts since those owners who report this method hold 17 percent of the land held by harvesters. Conversely, it seems that owners of large tracts favor clearcutting. While only 7 percent of the owners listed this method, they account for 25 percent of the acreage held by harvesters. Part of the explanation is that large forest industry holdings in Maryland tend to be concentrated in the Lower Eastern Shore unit and consist primarily of loblolly pine stands. Clearcutting is an acceptable, and often a preferred, method of regenerating loblolly pine stands.

Products harvested

Sawlogs are the most common single product harvested from private commercial forest land in Maryland. Forty percent of those who have harvested cut only sawlogs and they hold 31 percent of the land owned by harvesters. Pulpwood was the second most commonly harvested single product. Only 7 percent of the owners, holding 8 percent of the forest land owned by harvesters, listed pulpwood as the only product they harvested.

In recent years, there has been a trend toward multiple-product logging. With this system tree lengths are often skidded to where they are sorted into veneer logs, sawlogs, or pulp bolts. In some systems, once the sawlogs or veneer logs have been removed the remainder of the tree is chipped and shipped to a pulpmill. Maryland is no exception to this trend. Thirty-seven percent of those owners who have harvested cut more than one product from their lands. These 6,900 owners hold 604,200 acres of Maryland's privately owned commercial forest land.

Those owners who have harvested more than one product are generally owners of large tracts of forest land. Multiproduct harvesters hold an average of 87.6 acres while those who harvested only pulpwood own an average of 66.1 acres and those who harvested only sawlogs own, on an average, only 43.4 acres.

Forestry assistance

When asked what office, agency, or individual they would contact for forestry assistance an estimated 51 percent of the state's forest-land owners said they did not know. These owners hold 32 percent of Maryland's private commercial forest land. It should be noted that this question has a relatively high rate of "no answer", 20 percent. It would seem reasonable to assume that many of those owners who did not answer do not know who to contact.

Of those owners who listed an agency or individual, 17,100 owners or 18 percent of the state's owners listed "county." Another 1,000 owners listed the state forestry agency. In Maryland, forestry assistance to landowners is provided by the Maryland Forest Service through foresters at various locations throughout the state, frequently with offices in the county seat. Presumably, those owners who listed "county" meant the Maryland Forest Service, though owners seldom identified the agency by name.

Another 8,500 owners indicated various public forestry or conservation agencies in the U.S. Department of Agriculture such as the Soil Conservation Service, Forest Service, Agricultural Stabilization and Conservation Service, and the Cooperative Extension Service. While most of these agencies do not provide direct forestry assistance to forest-land owners, they would undoubtedly forward the request to the Maryland Forest Service. An estimated 200 owners indicated that they would contact either an industrial forester or a consulting forester.

An estimated 11,800 Maryland forest-land owners—only 12 percent—have received for-

estry assistance. These owners, however, hold larger than average tracts—68.3 acres—and account for 35 percent of the state's privately owned commercial forest land. In the Lower Eastern Shore unit, 11 percent of the owners have had forestry assistance but, they account for 55 percent of the private commercial forest land in the unit. Only 10 percent of the owners in the Western unit have availed themselves of forestry assistance yet they hold 39 percent of the private commercial forest land in the unit.

Most landowners—an estimated 3,900—who have had forestry assistance received assistance in tree planting. However, 2 percent or 1,700 have had general forest management assistance. These owners account for 272,000 acres of commercial forest land.

Public use

An estimated 62,200 Maryland forest-land owners—65 percent of the total—do not permit the general public to use their forest land for recreational purposes. These owners hold 48 percent of the private commercial forest land in the state. Of those owners who do permit the general public to use their forest land for recreation, most permit hunting—18,100. These owners hold 749,400 acres - about one-third of the private forest land in the state. Few owners permit picnicking or camping, only 6,500. It seems that more owners permit hunting than permit camping or picnicking because the latter activities often result in site degradation and littering. Most hunting, however, is transitory and hunters cause little site degradation or littering.

Although 65 percent of Maryland's forest-land owners do not permit the general public to use their land, only 41 percent actually post. Of these, an estimated 17,000 post their land to control access. These owners account for more commercial forest land than any other group who post their land—427,100 acres. When an owner posts his land to limit access, it does not necessarily mean that the land is unavailable to the recreationist. Rather, the owner wishes to know who is using his land, for what purpose, when, and where. These owners also reserve the right to exclude users whom they deem undesirable. Conversely, because land is not posted does not necessarily mean that it is available to the recreationist.

An estimated 12,700 owners post their land to control hunting. These owners hold 366,700 acres of Maryland's privately held commercial forest land.

LANDOWNER INTERESTS

To better understand owner interests and motivations we asked them to indicate from separate lists the organizations in which they are active and the publications they receive. The organizations included groups such as farmer and sportsman's associations, and conservation groups. We asked these questions to try to identify a medium of communication to forest-land owners. Often, programs of interest to forest-land owners do not succeed simply because the owners are not aware of the programs.

An estimated 62 percent of the private forest-land owners in Maryland are not active in any conservation, farmer, or sportsman's organization. Of those members who do belong to such organizations, more than half—an estimated 16,500 owners—are members of the National Wildlife Federation. These owners hold 213,500 acres. Second in popularity, 9,400 owners, were sportsman's clubs. Farmers organizations accounted for 4,900 owners.

It is not surprising that the most widely read periodicals are "National Wildlife" and "Ranger Rick", both publications of the National Wildlife Federation. Sportsman's publications such as "Field and Stream" and "Sports Afield" also reach many landowners. The owners who receive these publications tend to own more land than owners who are members of the National Wildlife Federation.

We can draw some general conclusions from this information on organization memberships and subscriptions. The owners who are interested enough to join a conservation organization or subscribe to a conservation periodical are primarily interested in the wildlife resource. Only a very few indicate interest in managing the timber resource of their lands.

CONSERVATION QUIZ

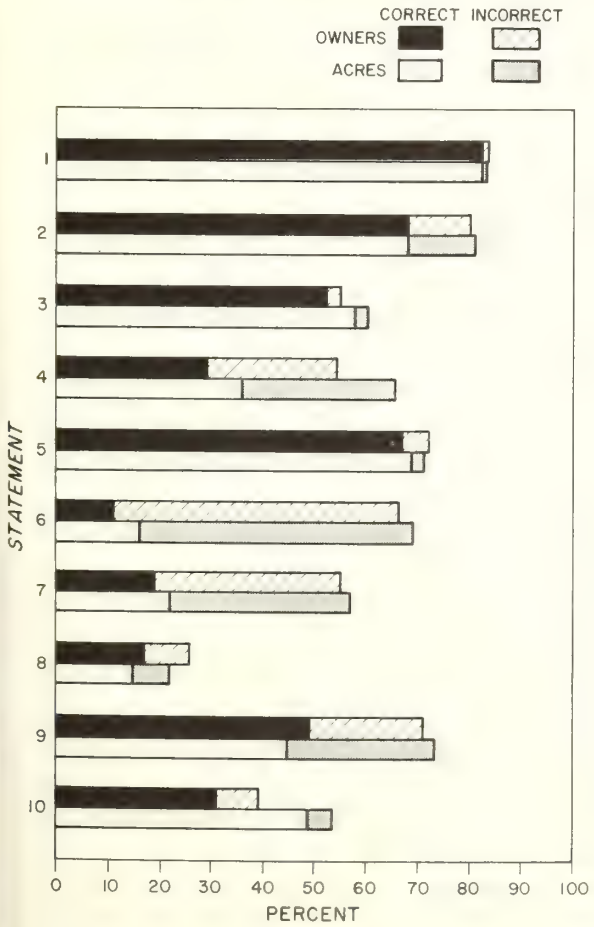
To learn how individual woodland owners define certain conservation and forestry terms, we asked those in our sample of owners to indicate whether each of 10 statements was true or false. The responses were then expanded for all individual woodland owners in the state. Percentages of various responses are shown in Figure 12. With a discussion of each statement, we have provided the answer that professionals in conservation and forestry would give.

Statement 1. Conservation means that natural resources should be used wisely.

Answer: True

This question had the highest correct response of the 10 statements.

Figure 12.—Responses to true-false statements by individuals and acres.



Statement 2. Once a forest is cut it will not grow back unless planted.

Answer: False

Over two-thirds answered this correctly. This indicates that most owners realize that a large percentage of the current stands in Maryland grew back naturally after previous harvests.

Statement 3. Sustained yield is an important forestry objective

Answer: True

Over half the owners would answer this correctly, and only 3 percent would say the statement was false.

Statement 4. Clearcutting is always bad forestry.

Answer: False

Nearly as many owners would answer incorrectly—26 percent—as answer correctly —29 percent. This forestry practice has received much adverse publicity. It is a sound practice in the southern pine types as well as in the oak/hickory type.

Statement 5. All forest land in the United States is managed.

Answer: False

This question has the third highest percentage of correct response. Most owners need look no farther than their own woodland to answer this correctly.

Statement 6. Selective logging is always good forestry.

Answer: False

This question is answered correctly only 11 percent of the time, and 56 percent of the owners would say this statement is true. Many owners apparently thought clearcutting was bad and reasoned that selective logging is, therefore, "good forestry."

Statement 7. Commercial forest land is forest land that is owned by wood-using industries.

Answer: False.

It is not surprising that so many owners — 36 percent — answered this question incorrectly since the term is used primarily by the Forest Service. See appendix for the definition.

Statement 8. An ecosystem is any complex of living organisms together with their environment that is isolated for study.

Answer: True

A majority of the owners would admit that they do not know the correct answer. This shows that those in our sample of owners made a sincere effort to answer the questions and seldom guessed at the correct response.

Statement 9. A virgin forest is any forest of old or large trees.

Answer: False

Nearly half — 49 percent — of the individual owners would answer this correctly. It seems that many owners still do not understand that a virgin forest is a forest that has not been disturbed by man.

Statement 10. Stumpage price is the price paid for standing timber.

Answer: True

Only 31 percent of the individual owners would answer correctly. Considering that only 23 percent of the individual owners have harvested in the past, this is not a bad percentage of correct response. This quiz shows that several forestry terms are unfamiliar to many forest-land owners in Maryland. And it points out that if the forest land in individual ownerships is to be managed for the production of renewable forest resources, much education is needed.

CONCLUSIONS

With 397 people per square mile, Maryland is the fifth most densely populated state in the Nation. Thus, in such an urbanized environment it is not surprising to find that the overwhelming majority of the state's 95,800 forest-land owners take little active or productive interest in their forested land. Seventy-two percent of these owners—holding 62 percent of the privately owned forest land—list such reasons for owning forest land as "land investment," "esthetic enjoyment," "part of the farm," or "part of the residence." Only 18 percent of the privately held commercial forest land in Maryland is held by owners who list timber production as the most important or second most important reason for owning forest land.

Perhaps even more telling is the fact that fewer than 12,000 owners have enlisted the assistance of a forester for any reason. These people own larger than average tracts and an aggregate of 805,400 acres. However, this begs the question since this leaves nearly 1.5 million acres held by owners who have never sought assistance. Certainly, many—if not most—of these tracts are of sufficient size and productive potential to be worthy of active management.

Our discussion of the availability of timber in Maryland reveals two significant points. First, while little privately owned commercial forest land in Maryland is actively managed for timber, more than 1.3 million acres are held by owners who express a willingness to harvest timber. This indicates that much of the harvesting that occurs is likely to be haphazard. Second, it would appear that under the present circumstances, Maryland is producing more timber than can be sustained from the available supply. The key to increasing timber output from Maryland's private commercial forest land appears to be encouraging a more active interest on the part of the owners in their land.

It should not be misconstrued that the authors advocate the ownership of forest land solely for the production of timber. What appears most significant to us is the large amount of forest land in Maryland that is held by owners who show only a passive interest in it. The development of a conscious active interest in forest land on the part of more owners will go a long way in enhancing the natural beauty of the state, increasing esthetic values for those who hold land for that reason, and increasing recreational and wildlife values for those who hold it for these reasons. In a highly urbanized state like Maryland, the promotion of forest management on private forest land solely for timber production is too narrow an objective. The objectives of each individual owner must be defined and met. In so doing, more timber will undoubtedly be made available as the nontimber objectives are met.

LITERATURE CITED

Birch, Thomas W., and Neal P. Kingsley.
1978. The forest-land owners of West Virginia. USDA For. Serv. Resour. Bull. NE-58. 76 p.

Birch, Thomas W., and Douglas S. Powell.
1978. The forest-land owners of Kentucky. USDA For. Serv. Resour. Bull. NE-54. 101 p.

Kingsley, Neal P.
1976. The forest-land owners of southern New England. USDA For. Serv. Resour. Bull. NE-41. 27 p.

Kingsley, Neal P., and Thomas W. Birch.
1977. The forest-land owners of New Hampshire and Vermont. USDA For. Serv. Resour. Bull. NE-51. 47 p.

Powell, Douglas S., and Neal P. Kingsley.
1980. The forest resources of Maryland. USDA For. Serv. Resour. Bull. NE-61. 103 p.

Turner, B.J., J.C. Finley, and N.P. Kingsley.
1977. How reliable are woodland owners' intentions? J. For. 75(8): 498-499.

APPENDIX

Study method

The sampling scheme used in this study was derived from the sampling design used in the forest survey by the Northeastern Station. Resources Evaluation field crews attempted to obtain the correct name and mailing address of the owner of each of the 720 privately owned forested field plots in the state. The field crews obtained usable addresses for more than 90 percent of the field plots. In addition, a list of owners of 500 or more acres of commercial forest land was obtained from the Maryland Forest Service. This list contained an estimate of the forest land they owned in 1975. A total of 813 questionnaires were mailed to owners of commercial forest land in Maryland. A total of 615 were returned with usable information—76 percent.

The questionnaire was developed after investigation of several earlier ownership studies and consultations with other investigators. The mailing consisted of the questionnaire plus a cover letter explaining the purpose of the survey. One week after the first mailing, a post card was sent reminding those that had not responded to do so and thanking those that had returned their questionnaire. After another week, those addressees who had not responded were mailed a second copy of the questionnaire and cover letter plus a second letter urging cooperation with the study. Approximately 1 month later, 404 owners had responded. Then a 100-percent field canvass of nonrespondents was undertaken by personnel of the Maryland Forest Service. This effort resulted in an additional 211 usable questionnaires. The 615 questionnaires represented 567 of the privately owned forested field plots—79 percent—and 179 of the 240 entries on the over 500 acre ownership list—75 percent.

The probability that a forest-land owner will be sampled depends on the rate of sampling and the acreage of commercial forest land he owns. Each unit in Maryland had a different rate of sampling. The state forestry organization is organized into four regions. The regional boundaries do not match the forest survey units. Each region had a different rate of success in persuading nonrespondents to reply. Both the survey rate of sampling and the region's success rate affect the probability of an owner being included in the final tabulations. The combinations of units and regions produces seven sampling areas in Maryland.

The total acreage of commercial forest land in private ownerships was obtained from the forest survey. To calculate the area represented by owners of 500 or more acres of commercial forest land, a ratio estimate of the responses and the acreage of forest land held by the large owners in each of the four regions was determined. To calculate the area represented by each of the over 500 acre responses, the estimated area in 500 acre or more ownerships was divided by the actual forest area owned by the large respondents in the region. This factor was then multiplied by the forested acreage owned by each owner with 500 acres or more who responded. For the owners of fewer than 500 acres the acreage of commercial forest land was estimated in a manner similar to that used in the forest survey. The area of privately owned land, other than in the 500 acre and over class, in each sampling area was divided by the number of field plots represented. Thus, if a particular respondent owned land on which one forested plot was located, his response was given a weight of 1. If a respondent represented two forested plots, his response received a weight of 2 or double the acreage, and so on.

Since the sampling scheme for this study is essentially the one used for the forest survey, owners of small parcels of woodland have a low probability of being included in the sample. To estimate the total number of persons who own commercial forest land in Maryland, it was necessary to weight the number of owners obtained in the sample. This procedure can be stated as:

$$N = \frac{CFL_p}{N_r} \quad \Sigma \quad \frac{1}{A_i}$$

where:

N = estimated number of private owners in the sampling area

CFL_p = the acres of privately owned commercial forest land in the sampling area

N_r = number of respondents in the sampling area

A_i = acres by individual respondent

The estimated total number of owners in the state equals the sum of the N's. The resulting number of owners is a statistically unbiased estimate of the total number of persons who own commercial forest land in Maryland.

The data were compiled by electronic computer using the FINSYS generalized computer system (Wilson, Robert W. Jr. and Robert C. Peters, 1967. The Northeastern Forest Inventory Data Processing System I: Introduction. USDA For. Serv. Res. Paper NE-61. 20 p.)

It was necessary to determine if those questionnaires obtained through the mail and those obtained by means of field follow-up were both samples of the same population. The hypothesis tested was that there was a significant difference in the mean acreage of the subsamples. Student's t-test showed no significant difference at the 99 percent probability level.

We also tested to determine if there was a significant difference between estimates of the amount of land owned by owners of 500 or more acres of commercial forest land. Four estimates were made. The first was the survey estimate based on the large owners who had forested field plots. The second was a simple expansion of the acreages of the respondents from the large owner list obtained from the state. The third was a regression estimate of their 1975 acreages. And the fourth was a ratio estimate using the acreages of the respondents from the large owner list and all of the 1975 acreage estimates. There were no significant differences in tests of the last three 1977 estimates. The first estimate seemed to underestimate the amount of commercial forest land in the over 500 acre class of owners by 13 percent.

We tested our method of estimating numbers of landowners by comparing our estimates of how many owners own 500 or more acres and the list of owners obtained from the state. There was no significant difference between the estimated number of owners of 500 or more acres and the number of large owners listed by the state.

Because this study encompasses seven sampling areas, data have been aggregated to the forest survey units. The following tabulation shows the pertinent data for each unit:

Unit	*Usable questionnaires*	*Survey plots*	*Average area per plot*
Central	241	204	5,005
Southern	133	131	2,805
Lower Eastern Shore	167	175	2,830
Western	83	57	7,067
Total	615	567	4,032

Sampling errors

Sampling errors were calculated for the estimated total number of forest-land owners in each unit and for the combined total. The sampling error for the number of acres of commercial forest land in private ownership was calculated as part of the forest survey. In addition, the estimated error of the land in the 500 acre and over class from the ratio estimate is ±4 percent. The user of these data is cautioned that, as the size of any estimate decreases in relation to the total estimate, the sampling error, expressed as a percent of the estimate, increases drastically.

The inclusion of small woodland parcels (nine acres and less) in the study population substantially influences the sampling error for the estimated number of owners.

	Sampling error Private commercial forest land	
Unit	*Acres*	*Percent*
Central	1,015.5	±3%
Southern	367.5	±3%
Lower Eastern Shore	495.2	±2%
Western	401.8	±2%
Total	2,280.0	±2%

Unit	Estimated population		More than 9 acres	
	Owners	Sampling errors	Owners	Sampling errors
Central	64,300	±14.45%	25,100	±11.66%
Southern	8,200	±19.02%	6,000	±10.58%
Lower Eastern Shore	15,700	±26.72%	6,300	±11.12%
Western	8,000	±15.06%	8,000	±15.06%
Total	96,200	±10.75%	45,400	± 7.27%

Definition of terms

Average annual net growth of growing stock. The change (resulting from natural causes) in volume of sound wood in sawtimber and poletimber trees during the period between surveys, divided by the length of the period. Components of annual net growth of growing stock include the increment in net volume of trees present at the beginning of the period and surviving to its end, plus net volume of trees reaching poletimber size during that period, minus the net volume of trees that died during the period, minus cull increment (the net volume of trees that became rough or rotten during the period).

Board foot. A unit of lumber measurement 1 foot long, 1 foot wide, and 1 inch thick, or its equivalent. By Resources Evaluation convention, softwoods less than 9.0 inches in dbh and hardwoods less than 11.0 inches in dbh do not contain board-foot volume.

Clearcutting. The method of regenerating timber in which the area is cut clear in the literal sense of the word; virtually all the trees, large and small, are removed. The term is often erroneously applied to any type of cutting in which all the merchantable timber is removed and all that is not merchantable is left standing.

Commercial forest land. Forest land that is producing or capable of producing crops of industrial wood (more than 20 ft^3/acre/year) and that is not withdrawn from timber utilization. (Industrial wood is all roundwood products except fuelwood.)

Diameter limit. The method of regenerating timber in which all trees above a specified diameter are removed.

Forest industries. Companies or individuals operating wood-using plants.

Forest land. Land that is at least 16.7 percent stocked (contains at least 7.5 ft^2 of basal area) by forest trees of any size, or that formerly had such tree cover and is not currently developed for nonforest use. (Forest trees are woody plants that have a well-developed stem and usually are more than 12 feet in height at maturity.) The minimum area for classification of forest land is 1 acre.

Growing-stock trees. Live trees of commercial species that are classified as sawtimber, poletimber, saplings, and seedlings; that is, all live trees of commercial species except rough and rotten trees.

Growing-stock volume. Net volume, in ft^3, of growing-stock trees that are 5.0 inches in dbh or larger, from a 1-foot stump to a minimum 4.0-inch top diameter outside bark of the central stem.

Hardwoods. Dicotyledonous trees, usually broad-leaved and deciduous.

Private commercial forest land. All commercial forest land other than that owned by federal, state, or local governments or their agencies.

Pulpwood. Any log from which woodpulp is to be made; usually measured in bolts of 4, 5, or 8 feet, and somewhat smaller in diameter than sawlogs or veneer logs.

Sawlog. Any log from which lumber is to be sawed.

Sawtimber trees. Live trees of commercial species: (a) that are of the following minimum diameter at breast height: softwoods, 9.0 inches and hardwoods, 11.0 inches, and (b) that contain at least one 12-foot or two noncontiguous 8-foot merchantable sawlogs,

and that meet regional specifications for freedom from defect.

Sawtimber volume. Net volume in board feet, International ¼-inch rule, of merchantable sawlogs in live sawtimber trees. Net volume equals gross volume less deductions for rot, sweep, and other defects that affect use for lumber.

Selection system. The method of regenerating timber in which trees of all sizes are harvested. However, in practice, frequently only the oldest or largest trees in a stand are harvested. Trees are taken singly or in small groups, but the entire stand is never cleared completely in a single operation.

Softwoods. Coniferous trees, usually evergreen, with needles or scalelike leaves.

Stand. A growth of trees on forest land.

Timber removals. The volume of growing-stock or sawtimber trees harvested or killed in logging or in cultural operations such as timber stand improvement, land clearing, or changes in land use.

Timber salvage. Removals of down, damaged, or diseased trees.

Veneer log. Any log from which veneer is to be made, by peeling (rotary cutting) or slicing.

Metric equivalents

One inch = 25.4 millimeters (mm) or 2.54 centimeters (cm)
One foot = 30.48 centimeters for 0.3048 meters (m)
One mile = 1.609 kilometers (km)
One square foot (ft^2) = 929.03 square centimeters (cm^2) or 0.0929 meters (m^2)
One acre = 4,046.873 square meters or 0.4046873 hectares (ha)
Million acres = 404,687.3 hectares
One cubic foot (ft^3) = 28,317 cubic centimeters (cm^3) or 0.028317 cubic meters (m^3)
Thousand cubic feet = 28.317 cubic meters
Million cubic feet = 28,317 cubic meters

QUESTIONNAIRE

NE FOREST EXPERIMENT STATION
FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE

OMB 40-R-3941

NORTHEASTERN WOODLAND OWNERSHIP STUDY

State _____

County_____

Plot _____

Please complete the following questions to the best of your knowledge. Where actual data are not available please use your best estimate. Please be assured your answers will be held strictly confidential. If you do not now own woodland, please answer questions 1 and 2 and return the questionnaire.

1. How much land do you now own? (Include woodlands, pasture, cropland, etc., but exclude individual house lots.) Acres_____

2. Of all of the land you own how much is woodland? Acres_____ or percent_____

3. Is all of the woodland you own in one state?

   Yes _____ What state?_____

   No _____ My woodlands are in more than one state as follows:

   _____ acres in _____ (state)

   _____ acres in _____ (state)

   _____ acres in _____ (state

   _____ acres in _____ (state)

4. How many individual tracts or parcels of woodland do you own? Number_____

5. In what year did you first acquire woodland? Year _____

6. How did you acquire the major portion of the woodland you now own?

Purchase	1.	_____
Inheritance	2.	_____
Other	3.	_____

7. In which one of the following ownership categories does the major portion of your woodland holdings fall? (Please check only one.)

		Check one
Individual (include husband and wife)	1.	_____
Joint ownership	2.	_____
Undivided estate	3.	_____
Partnership	4.	_____
Corporation	5.	_____
Club or association	6.	_____
Other	7.	_____

8. If the ownership is a partnership, corporation, club, or association, what is the nature of the business or organization? Or, if woodland is part of an active farm, write in the word "farm" in the space below.

_____

Please indicate the title of the person completing this questionnaire.

---

9. What is the approximate road mileage from your home to your nearest and furthest tract of woodland? (For businesses or organizations consider "home" to mean place of business, or location of organization.)

Miles to the nearest tract (enter zero if you live on the tract). _____

Miles to the furthest tract. _____

10. How many times have you or your representative visited your nearest and furthest tract of woodland in the last 12 months?

Number of visits to the nearest tract _____

Number of visits to the furthest tract _____

11. Which statement most accurately describes your woodland?

Check one

a. Most of the trees are sugar (hard) maple, beech, and yellow birch. _____

b. Most of the trees are red (soft) maple, elm, and ash. _____

c. Most of the trees are oaks, hickories, gums, and yellow-poplar. _____

d. Most of the trees are pines. _____

e. Most of the trees are softwoods other than pines. _____

f. None of the above apply. Please describe your woodland briefly: _____

_____

g. I do not know what kinds of trees are on my land. _____

12. Which statement most accurately describes average size of the trees in your woodland?

Check one

a. The average tree is 5 inches in diameter or smaller. _____

b. The average tree is between 5 and 12 inches in diameter. _____

c. The average tree is 12 inches in diameter or larger. _____

d. I don't know how big the trees are. _____

13. Have you ever harvested timber or trees from your land?

Yes 1._____ No. 2._____

NOTE: IF YOU HAVE NEVER HARVESTED TIMBER OR TREES FROM YOUR WOODLAND SKIP TO QUESTION 23.

14. In what year did the most recent timber harvest take place? _____

15. What percent of your woodland was involved in the most recent timber sale? _____

16. What percent, if any, of your woodland do you feel you would never harvest timber from? _____

17. What products were harvested? (Check as many as apply.)

		Check			Check
Sawlogs	1.	_____	Mine timbers	6.	_____
Veneer logs or bolts	2.	_____	Christmas trees	7.	_____
Pulpwood	3.	_____	Other (please specify)_____	8.	_____
Turnery bolts	4.	_____	Don't know what products were harvested	9.	_____
Posts, poles, or piling	5.	_____			

18. Please indicate amounts of products harvested.

Product	Amount	Unit of measure
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

19. How were your trees selected for harvesting? (Please check only the method that accounted for the greatest volume, if more than one method was used.)

	Check one
Selection (only preselected market trees were removed).	1. _____
Diameter limit (only trees over a minimum diameter were removed). Please indicate minimum diameter _____	2. _____
Clearcutting (most or all of the trees on a given area were removed).	3. _____
Land clearing (trees were harvested incidental to clearing the land for a use other than woodland).	4. _____
Other (please specify) _____	5. _____
Don't know method used.	6. _____

20. Who selected the area or trees to be harvested?

	Check one
1. Landowner	_____
2. Forester	_____
3. Friend or neighbor	_____
4. Timber buyer or logger	_____
5. Combination of _____ and_____	_____

21. If you did not have the assistance of a forester in the harvesting of your timber, do you now wish you had?

	Check
Yes	_____
If yes, why _____	_____
No	_____
No feeling either way	_____

22. Why did you harvest timber at the time that you did? (Check only the one reason you consider most important.)

		Check one
Felt timber was mature	1.	_____
Offered a good price	2.	_____
Land clearing	3.	_____
Needed money	4.	_____
Needed timber for own use	5.	_____
Timber harvest for company use (industry only)	6.	_____
Other (please specify) _____	7.	_____

23. If you have never harvested timber or trees from your land, why not? (Please check only the reason you consider most important).

		Check one
Woodland immature - timber too small	1.	_____
No market for timber	2.	_____
Price offered or prevailing market price too low	3.	_____
Value of land for hunting would be destroyed	4.	_____
Selling or plan to sell the land	5.	_____
Scenery would be destroyed	6.	_____
Land tied up in estate	7.	_____
Distrust of loggers	8.	_____
Opposed to timber harvesting	9.	_____
Poor quality timber	10.	_____
Not enough volume	11.	_____
Logging would create a fire hazard	12.	_____
Insufficient area to harvest	13.	_____
Other (please specify) _____	14.	_____

24. Do you plan to harvest timber from your woodlands in:

		Check one
Next 5 years	1.	_____
5 to 10 years	2.	_____
Possibly at some future date	3.	_____
Never plan to harvest	4.	_____

25. Have you ever sought the assistance of a forester for advice or help in managing your woodland?

Yes _____ Please indicate the nature of assistance. _____

_____

No _____

26. What office, agency, or individual would you contact for forestry assistance? (If you don't know, please write in "don't know.")

_____

27. Why do you own woodland? (Please rank in order of importance those items that are applicable, with number 1 the most important.)

	Rank
Land investment (hope to sell all or part of my woodland at a profit).	____
Recreation (hunting, camping, fishing, etc.).	____
Timber production (growing timber or other forest products for sale).	____
Farm or domestic use (source of forest products for own use, i.e., firewood, fence posts, etc.).	____
Aesthetic enjoyment (the desire to have woodland and "green space" around my home).	____
Part of the farm (the woodland is part of the farm but serves no useful function in the farm operation).	____
Part of my residence.	____
Other (please specify) _____	____

28. Which of the following do you feel were the most important benefits you derived from your woodland in the last 5 years? (Please rank in order of importance those items that are applicable, with number 1 the most important.)

	Rank
Increase in land value (investment).	____
Recreation (hunting, fishing, camping, etc.).	____
Income from the sale of timber.	____
Aesthetics (just enjoy woodland, wildlife, and the general satisfaction of owning "green space").	____
Farm and domestic use.	____
Other (please specify) _____	____

29. Which of the following do you feel will be the most important benefits you expect to derive from your woodland in the next 5 years? (Please rank in order of importance those items that are applicable, with number 1 the most important.)

	Rank
Increase in land value (investment).	_____
Recreation (hunting, camping, etc.).	_____
Income from sale of timber.	_____
Aesthetics (just enjoy woodland, wildlife, and the general satisfaction of owning "green space").	_____
Farm or domestic use.	_____
Other (please specify) _____	_____

30. Is the general public, other than your family and immediate circle of friends, permitted to use your woodland for any of the following?

		Check
Public use not permitted	1.	_____
Public use permitted:		
Hiking	2.	_____
Picnicking	3.	_____
Camping	4.	_____
Fishing (check only if fishing is available)	5.	_____
Hunting	6.	_____
Snowmobiling	7.	_____
Other (please specify)	8.	_____

31. Is you land posted?

No _____, go to next question.

Yes_____, why is it posted? _____

32. Have you been approached to sell all or part of your woodland in the last five years?

Yes _____ No _____

33. Are you an active member of any of the following organizations? (Please check those you are a member of.)

		Check
American Forestry Association	1.	____
Ohio Forestry Association	2.	____
Pennsylvania Forestry Association	3.	____
Isaak Walton League	4.	____
Audubon Society	5.	____
Natural History Society	6.	____
National Wildlife Federation	7.	____
A Sportsman's Club	8.	____
A Garden Club	9.	____
National Farmer's Organization	10.	____
The Grange	11.	____
The American Tree Farm Program	12.	____
The Sierra Club	13.	____
Any other organizations similar to those listed above (Please specify)_____	14.	____
No, I don't hold membership in any of the above.	15.	____

34. Do you or any member of your household subscribe to any of the following magazines? (Please check those that apply.)

		Check
Tree Farm News	1.	____
American Forests	2.	____
National Wildlife	3.	____
Forest Farmer	4.	____
Ohio Woodlands	5.	____
Pennsylvania Forests	6.	____
Pennsylvania Game News	7.	____
Audubon Magazine	8.	____
National Parks and Recreation	9.	____
Field and Stream	10.	____
Sports Afield	11.	____
Kentucky Farmer	12.	____
Agway Cooperator	13.	____
Ranger Rick Nature Magazine	14.	____
Our Heritage	15.	____
Forests and People	16.	____
Ohio Farmer	17.	____
Maryland Conservation	18.	____
West Virginia Conservation	19.	____
Pennsylvania Farmer	20.	____
Any other magazine similar to those listed above (Please specify) _____	21.	____
No, I don't subscribe to any of the above magazines.	22.	____

35. Please indicate whether each of the following statements is true or false. If you feel you don't know, don't guess, please check "Don't Know" column.

	True	False	Don't Know
a. Conservation means that natural resources should be used wisely.	____	____	____
b. Once a forest is cut it will not grow back unless planted.	____	____	____
c. Sustained yield is an important forestry objective.	____	____	____
d. Clearcutting is always bad forestry.	____	____	____
e. All forest land in the United States is managed.	____	____	____
f. Selective logging is always good forestry.	____	____	____
g. Commercial forest land is forest land that is owned by wood-using industries.	____	____	____
h. An ecosystem is any complex of living organisms together with their environment.	____	____	____
i. A virgin forest is any forest of old or large trees.	____	____	____
j. Stumpage price is the price paid for standing timber.	____	____	____

The following questions are asked to classify responses on the basis of information about the owner personally. Again, we would remind you that the answers to these questions, and to any other questions on this questionnaire are strictly confidential. All answers will be compiled in such a manner that it will be impossible to identify any individual reply.

These questions do not pertain to and should not be answered by corporations and organizations.

If the woodland is owned by more than one person, the following questions should be answered for the person to whom the questionnaire is addressed.

36. During the first 12 years of the owner's life where did he live most of the time?

		Check one
In a city with a population of 100,000 or more	1.	_____
In a city with a population of 10,000 to 99,999	2.	_____
In a town or city with a population of less than 10,000	3.	_____
In a rural area	4.	_____
On a farm	5.	_____

37. What is the sex of the owner?

Male _____ Female _____

38. What is the age of the owner?

		Check one
Under 25	1.	_____
25-44	2.	_____
45-64	3.	_____
65 and over	4.	_____

39. How many years of formal education has the owner completed?

		Check one
Grades 1- 8	1.	_____
Grades 9-12	2.	_____
Has some schooling beyond high school (business technical school, or some college)	3.	_____
Has a bachelor's degree or equivalent	4.	_____
Has some graduate work	5.	_____
Holds a master's degree	6.	_____
Holds a doctoral degree	7.	_____

40. What is the primary occupation of the owner? _____

41. In which category would the owner's personal gross income from all sources fall?

		Check one
Less than $10,000	1.	_____
$10,000 to $14,999	2.	_____
$15,000 to $19,999	3.	_____
$20,000 to $24,999	4.	_____
$25,000 to $29,999	5.	_____
$30,000 or more	6.	_____

42. Comments?

INDEX TO TABLES

Table No.

1 Estimated number of private owners and acres of commercial forest land owned, by size class and geographic unit, Maryland, 1977.

2 Estimated number of private owners and acres of commercial forest land owned, by form of ownership, percent of harvesters, percent of acres owned by harvesters, and geographic unit, Maryland, 1977.

3 Estimated number of corporate owners and acres of commercial forest land owned, by nature of business, Maryland, 1977.

4 Estimated number of individual owners and acres of commercial forest land owned, by occupation and geographic unit, Maryland, 1977.

5 Number of individual owners and acreage owned, by age class, education level, income category, and life environment, Maryland, 1977.

6 Number of individual owners and acreage owned, by age class, education level, income category, and life environment, Central geographic unit, Maryland, 1977.

7 Number of individual owners and acreage owned, by age class, education level, income category, and life environment, Southern geographic unit, Maryland, 1977.

8 Number of individual owners and acreage owned, by age class, education level, income category, and life environment, Lower Eastern Shore geographic unit, Maryland, 1977.

9 Number of individual owners and acreage owned, by age class, education level, income category, and life environment, Western geographic unit, Maryland, 1977.

10 Estimated number of private owners and acres of commercial forest land owned, by period of ownership and geographic unit, Maryland, 1977.

11 Estimated number of individual owners and acres of commercial forest land owned, by period of ownership and geographic unit, Maryland, 1977.

12 Estimated number of private owners and acres of commercial forest land owned, by distance from tracts and number of tracts owned, Maryland, 1977.

13 Estimated number of private owners and acres of commercial forest land owned, by primary reason for owning and harvesters and nonharvesters, Maryland, 1977.

14 Estimated number of private owners and acres of commercial forest land owned, by primary reason for owning and harvesters and nonharvesters, Central geographic unit, Maryland, 1977.

15 Estimated number of private owners and acres of commercial forest land owned, by primary reason for owning and harvesters and nonharvesters, Southern geographic unit, Maryland, 1977.

16 Estimated number of private owners and acres of commercial forest land owned, by primary reason for owning and harvesters and nonharvesters, Lower Eastern Shore geographic unit, Maryland, 1977.

17 Estimated number of private owners and acres of commercial forest land owned, by primary reason for owning and harvesters and nonharvesters, Western geographic unit, Maryland, 1977.

18 Estimated number of private owners and acres of commercial forest land owned, by primary and secondary reason for owning, Maryland, 1977.

19 Estimated number of private owners and acres of commercial forest land owned, by primary reason for owning and expected time of future harvest, Maryland, 1977.

20 Estimated number of private owners and acres of commercial forest land owned, by primary benefit derived in last 5 years, primary benefit expected in the next 5 years, and by harvesters and nonharvesters, Maryland, 1977.

21 Estimated number of private owners and acres of commercial forest land owned, by primary benefit derived in the last 5 years, primary benefit expected in the next 5 years, and harvesters and nonharvesters, Central geographic unit, Maryland, 1977.

22 Estimated number of private owners and acres of commercial forest land owned, by primary benefit derived in the last 5 years, primary benefit expected in the next 5 years, and harvesters and nonharvesters, Southern geographic unit, Maryland, 1977.

23 Estimated number of private owners and acres of commercial forest land owned, by primary benefit derived in the last 5 years, primary benefit expected in the next 5 years, and harvesters and nonharvesters, Lower Eastern Shore geographic unit, Maryland, 1977.

24 Estimated number of private owners and acres of commercial forest land owned, by primary benefit derived in the last 5 years, primary benefit expected in the next 5 years, and harvesters and nonharvesters, Western geographic unit, Maryland, 1977.

25 Estimated number of private owners and acres of commercial forest land owned, by primary benefit expected in the next 5 years and expected time of future harvest, Maryland, 1977.

26 Estimated number of private owners who have harvested timber and acres of commercial forest land owned, by reason for harvesting and form of ownership, Maryland, 1977.

27 Estimated number of private owners who have harvested timber and acres of commercial forest land owned, by reason for harvesting and form of ownership, Maryland, 1977.

28 Estimated number of private owners who have not harvested timber and acres of commercial forest land owned, by reason for not harvesting and form of ownership, Maryland, 1977.

29 Estimated number of private owners who have not harvested timber and acres of commercial forest land owned, by reason for not harvesting and geographic unit, Maryland, 1977.

30 Expected number of private owners and acres of commercial forest land owned, by expected time of future harvest and harvesters and nonharvesters, Maryland, 1977.

31 Expected number of private owners and acres of commercial forest land owned, by expected time of future harvest and harvesters and nonharvesters, Central geographic unit, Maryland, 1977.

32 Expected number of private owners and acres of commercial forest land owned, by expected time of future harvest and harvesters and nonharvesters, Southern geographic unit, Maryland, 1977.

33 Expected number of private owners and acres of commercial forest land owned, by expected time of future harvest and harvesters and nonharvesters, Lower Eastern Shore geographic unit, Maryland, 1977.

34 Expected number of private owners and acres of commercial forest land owned, by expected time of future harvest and harvesters and nonharvesters, Western geographic unit, Maryland, 1977.

35 Estimated number of private owners and acres of commercial forest land owned, by size class and expected time of future harvest, Maryland, 1977.

36 Estimated number of private owners who have harvested timber and acres of commercial forest land owned, by individual selecting timber and method of selecting timber, Maryland, 1977.
37 Estimated number of private owners who have harvested timber and acres of commercial forest land owned, by timber product harvested, Maryland, 1977.
38 Estimated number of private owners and acres of commercial forest land owned, by agency that owners would contact for forestry assistance, Maryland, 1977.
39 Estimated number of private owners who have received forestry assistance and acres of commercial forest land owned, by type of assistance, Maryland, 1977.
40 Estimated number of private owners and acres of commercial forest land owned, by type of public use permitted, Maryland, 1977.
41 Estimated number of private owners who have posted their land and acres of commercial forest land owned, by reason for posting, Maryland, 1977.
42 Estimated number of individual owners and acres of commercial forest land owned, by membership in conservation-related organizations, Maryland, 1977.
43 Estimated number of individual owners and acres of commercial forest land owned, by conservation-oriented publications they receive, Maryland, 1977.
44 Estimated number of individual owners and acres of commercial forest land owned, by statement and response to statement of conservation quiz, Maryland, 1977.
45 Estimated number of individual owners and acres of commercial forest land owned, by response to conservation quiz, Maryland, 1977.

Table 1.—Estimated number of private owners and acres of commercial forest land owned, by size class and geographic unit, Maryland, 1977.

Size class (in acres)	Central		Southern		Lower Eastern Shore		Western		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
					OWNERS					
1- 9	41,000	64	2,200	27	9,400	59	a	a	52,600	55
10- 19	10,600	17	2,000	25	2,100	13	2,800	35	17,500	18
20- 49	8,500	13	2,200	27	2,400	15	3,500	44	16,600	17
50- 99	2,500	4	800	10	1,100	7	900	11	5,300	6
100-199	1,000	2	600	7	400	3	400	5	2,400	3
200-499	300	W	300	4	300	2	300	4	1,200	1
500+	W	W	W	W	100	1	100	1	200	W
Total	63,900	100	8,100	100	15,800	100	8,000	100	95,800	100
					ACRES OWNED					
1- 9	141,900	14	8,300	2	19,600	4	a	a	169,800	7
10- 19	139,300	14	27,700	8	25,300	5	32,600	8	224,900	10
20- 49	258,000	25	66,600	18	70,200	14	91,400	23	486,200	21
50- 99	176,000	17	52,700	14	70,100	14	58,700	15	357,500	16
100-199	128,400	13	77,700	21	50,500	10	52,200	13	308,800	14
200-499	88,200	9	86,000	24	84,200	17	84,900	21	343,300	15
500+	83,700	8	48,500	13	175,300	36	82,000	20	389,500	17
Total	1,015,500	100	367,500	100	495,200	100	401,800	100	2,280,000	100

[a]Sampling detected no owners of fewer than 10 acres.

(W)Fewer than 50 owners or less than 0.5 percent.

Table 2.—Estimated number of private owners and acres of commercial forest land owned, by form of ownership, percent of harvesters, percent of acres owned by harvesters, and geographic unit, Maryland, 1977

Form of ownership	All private owners		Acres owned		Harvesters	Acres owned by harvesters
	Number	*Percent*	*Number*	*Percent*	*Percent*	*Percent*
			CENTRAL			
Individual[a]	54,300	85	736,400	72	16	30
Corporation	5,000	8	161,200	16	W	6
Partnership	3,000	5	58,800	6	1	3
Other[b]	1,600	2	59,100	6	1	4
Total	63,900	100	1,015,500	100	18	43
			SOUTHERN			
Individual	7,300	89	269,700	74	26	43
Corporation	400	5	62,900	17	1	12
Partnership	300	5	23,800	6	1	1
Other	100	1	11,100	3	1	2
Total	8,100	100	367,500	100	29	58
			LOWER EASTERN SHORE			
Individual	14,300	90	338,300	68	24	45
Corporation	400	3	127,300	26	1	21
Partnership	100	1	18,400	4	W	3
Other	1,000	6	11,200	2	W	1
Total	15,800	100	495,200	100	25	70
			WESTERN			
Individual[a]	7,200	88	297,700	74	32	37
Corporation	400	6	66,000	17	4	13
Partnership	200	3	25,100	6	3	5
Other[b]	200	3	13,000	3	—	—
Total	8,000	100	401,800	100	39	55
			TOTAL			
Individual	83,100	87	1,642,100	72	20	37
Corporation	6,200	6	417,400	18	W	11
Partnership	3,600	4	126,100	6	1	3
Other	2,900	3	94,400	4	1	2
Total	95,800	100	2,280,000	100	22	53

[a] Includes joint ownerships.
[b] Includes undivided states, clubs, associations, etc.
(W) Fewer than 50 owners or less than 0.5 percent.

Table 3.—Estimated number of corporate owners and acres of commercial forest land owned, by nature of business, Maryland, 1977

Nature of business	Corporate owners		Acres owned	
	Number	*Percent*	*Number*	*Percent*
Forest Industry	W	W	107,600	26
Non-forest industry	200	3	44,500	11
Non-industrial business	3,400	54	35,700	8
Real estate	1,600	25	132,700	32
Corporate farms	800	13	60,700	14
Other corporations	200	5	36,200	9
Total	6,200	100	417,400	100

(W) Fewer than 50 owners or less than 0.5 percent.

Table 4.—Estimated number of individual owners and acres of commercial forest land owned, by occupation and geographic unit, Maryland, 1977

Occupation	Central		Southern		Lower Eastern Shore		Western		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
					OWNERS					
Professional	8,500	16	300	4	700	4	100	1	9,600	11
Executive	5,000	9	500	7	200	1	700	10	6,400	8
Retired	6,900	13	800	11	4,300	31	1,100	15	13,100	16
White collar	8,700	16	1,700	23	500	3	500	7	11,400	14
Skilled laborer	12,700	23	1,000	14	1,400	10	1,600	23	16,700	20
Unskilled laborer	100	W	400	5	300	2	1,000	13	1,800	2
Housewife	1,300	2	500	7	2,900	20	400	6	5,100	6
Farmer	5,500	10	1,300	18	2,800	20	1,200	17	10,800	13
Other	—	—	W	W	—	—	—	—	W	W
No answer	5,600	11	800	11	1,200	9	600	8	8,200	10
Total	54,300	100	7,300	100	14,300	100	7,200	100	83,100	100
					ACRES OWNED					
Professional	123,300	17	26,200	10	16,900	5	18,200	6	184,600	11
Executive	87,000	12	34,200	13	28,800	9	28,400	9	178,400	11
Retired	83,200	11	47,200	18	82,100	24	61,700	21	274,200	17
White collar	63,800	8	13,900	5	14,000	4	26,100	9	117,800	7
Skilled laborer	58,200	8	36,000	13	16,800	5	33,800	11	144,800	9
Unskilled laborer	4,500	1	11,100	4	8,400	2	19,600	7	43,600	3
Housewife	32,000	4	8,300	3	12,100	4	6,500	2	58,900	3
Farmer	167,700	23	54,800	20	127,100	38	57,100	19	406,700	25
Other	—	—	1,200	W	—	—	—	—	1,200	W
No answer	116,700	16	36,800	14	32,000	9	46,400	16	231,900	14
Total	736,400	100	269,700	100	338,200	100	297,800	100	1,642,100	100

(W) Fewer than 50 owners or less than 0.5 percent.

Table 5.—Number of individual owners and acreage owned, by age class, education level, income category, and life environment, Maryland, 1977.

Owner attributes	Number of owners	Percent of owners	Acres of commercial forest land owned	Percent of acres
		AGE CLASS		
Under 25	100	W	2,800	W
25-44	27,900	34	311,600	19
45-64	33,300	40	725,100	44
65 and over	18,300	22	470,600	29
No answer	3,500	4	132,000	8
Total	83,100	100	1,642,100	100
		EDUCATION LEVEL		
0-8 years	15,000	18	267,800	16
9-12 years	30,800	37	418,900	26
1-4 years of college	19,900	24	518,900	32
More than 4 years of college	11,200	14	216,300	13
No answer	6,200	7	220,200	13
Total	83,100	100	1,642,100	100
		INCOME CATEGORY		
Less than $10,000	20,000	24	364,400	22
$10,000 to $14,999	12,700	15	195,400	12
$15,000 to $19,999	15,000	18	120,900	7
$20,000 to $24,999	4,800	6	76,100	5
$25,000 to $29,999	4,300	5	87,800	5
$30,000 or more	10,200	12	368,500	23
No answer	16,100	20	429,000	26
Total	83,100	100	1,642,100	100
		TYPE OF ENVIRONMENT[a]		
City over 100,000	9,100	11	202,600	12
City 10,000-99,999	11,600	14	115,100	7
Town or city under 10,000	10,600	13	186,300	12
Rural area	18,200	22	281,500	17
On a farm	29,000	35	675,300	41
No answer	4,600	5	181,300	11
Total	83,100	100	1,642,100	100

[a]First 12 years of life
(W) Less than 0.5 percent or fewer than 50 owners.

Table 6.—Number of individual owners and acreage owned, by age class, education level, income category, and life environment, Central geographic unit, Maryland, 1977

Owner attributes	Number of owners	Percent of owners	Acres of commercial forest land owned	Percent of acres
		AGE CLASS		
Under 25	—	—	—	—
25-44	20,800	38	161,300	22
45-64	21,600	40	343,000	47
65 and over	9,600	18	173,300	23
No answer	2,300	4	58,800	8
Total	54,300	100	736,400	100
		EDUCATION LEVEL		
0-8 years	6,800	13	90,900	12
9-12 years	20,100	37	150,400	21
1-4 years of college	13,600	25	265,800	36
More than 4 years of college	9,800	18	134,400	18
No answer	4,000	7	94,900	13
Total	54,300	100	736,400	100
		INCOME CATEGORY		
Less than $10,000	9,600	18	114,900	16
$10,000 to $14,999	8,900	16	87,500	12
$15,000 to $19,999	13,600	25	71,900	10
$20,000 to $24,999	3,600	7	36,800	5
$25,000 to $29,999	2,400	4	49,300	7
$30,000 or more	8,200	15	186,800	25
No answer	8,000	15	189,200	25
Total	54,300	100	736,400	100
		TYPE OF ENVIRONMENT[a]		
City over 100,000	8,000	15	131,300	18
City 10,000-99,999	9,900	18	62,800	9
Town or city under 10,000	9,000	17	90,900	12
Rural area	10,700	20	116,700	16
On a farm	14,000	25	250,200	34
No answer	2,700	5	84,500	11
Total	54,300	100	736,400	100

[a]First 12 years of life

Table 7.—Number of individual owners and acreage owned, by age class, education level, income category, and life environment, Southern geographic unit, Maryland, 1977

Owner attributes	Number of owners	Percent of owners	Acres of commercial forest land owned	Percent of acres
		AGE CLASS		
Under 25	—	—	—	—
25-44	3,000	41	40,500	15
45-64	2,500	34	119,800	45
65 and over	1,600	22	79,000	29
No answer	200	3	30,400	11
Total	7,300	100	269,700	100
		EDUCATION LEVEL		
0-8 years	1,400	19	47,200	18
9-12 years	1,800	25	72,900	27
1-4 years of college	3,100	42	76,300	28
More than 4 years of college	700	10	37,300	14
No answer	300	4	36,000	13
Total	7,300	100	269,700	100
		INCOME CATEGORY		
Less than $10,000	1,300	18	52,700	20
$10,000 to $14,999	1,100	15	31,300	12
$15,000 to $19,999	600	8	27,700	10
$20,000 to $24,999	1,000	14	16,700	6
$25,000 to $29,999	1,600	22	11,100	4
$30,000 or more	900	12	56,900	21
No answer	800	11	73,300	27
Total	7,300	100	269,700	100
		TYPE OF ENVIRONMENT[a]		
City over 100,000	400	5	34,500	13
City 10,000-99,999	1,500	21	13,900	5
Town or city under 10,000	300	4	18,800	7
Rural area	800	11	42,900	16
On a farm	4,000	55	140,200	52
No answer	300	4	19,400	7
Total	7,300	100	269,700	100

[a]First 12 years of life

Table 8.—Number of individual owners and acreage owned, by age class, education level, income category, and life environment, Lower Eastern Shore geographic unit, Maryland, 1977

Owner attributes	Number of owners	Percent of owners	Acres of commercial forest land owned	Percent of acres
		AGE CLASS		
Under 25	100	1	2,800	1
25-44	1,400	10	36,500	11
45-64	6,100	43	155,900	46
65 and over	5,800	40	125,600	37
No answer	900	6	17,400	5
Total	14,300	100	338,200	100
		EDUCATION LEVEL		
0-8 years	5,300	37	65,900	19
9-12 years	5,200	37	107,400	32
1-4 years of college	2,000	14	110,200	33
More than 4 years of college	200	1	16,800	5
No answer	1,600	11	37,900	11
Total	14,300	100	338,200	100
		INCOME CATEGORY		
Less than $10,000	5,400	38	68,000	20
$10,000 to 14,999	1,100	8	30,900	9
$15,000 to $19,999	800	6	14,800	4
$20,000 to $24,999	200	1	16,100	5
$25,000 to $29,999	200	1	14,300	4
$30,000 or more	700	5	94,100	28
No answer	5,900	41	100,000	30
Total	14,300	100	338,200	100
		TYPE OF ENVIRONMENT[a]		
City over 100,000	400	3	30,300	9
City 10,000-99,999	W	W	15,300	4
Town or city under 10,000	500	3	29,500	9
Rural area	4,500	32	63,800	19
On a farm	7,700	54	173,400	51
No answer	1,200	8	25,900	8
Total	14,300	100	338,200	100

[a]First 12 years of life.
(W) Fewer than 50 owners or less than 0.5 percent.

Table 9.—Number of individual owners and acreage owned, by age class, education level, income category, and life environment, Western geographic unit, Maryland, 1977

Owner attributes	Number of owners	Percent of owners	Acres of commercial forest land owned	Percent of acres
		AGE CLASS		
Under 25	—	—	—	—
25-44	2,700	38	73,300	25
45-64	3,100	43	106,400	36
65 and over	1,300	18	92,700	31
No answer	100	1	25,400	8
Total	7,200	100	297,800	100
		EDUCATION LEVEL		
0-8 years	1,500	21	63,800	22
9-12 years	3,700	51	88,200	30
1-4 years of college	1,200	17	66,600	22
More than 4 years of college	500	7	27,800	9
No answer	300	4	51,400	17
Total	7,200	100	297,800	100
		INCOME CATEGORY		
Less than $10,000	3,700	51	128,800	43
$10,000 to $14,999	1,600	22	45,700	16
$15,000 to $19,999	W	W	6,500	2
$20,000 to $24,999	W	W	6,500	2
$25,000 to $29,999	100	1	13,100	5
$30,000 or more	400	6	30,700	10
No answer	1,400	20	66,500	22
Total	7,200	100	297,800	100
		TYPE OF ENVIRONMENT[a]		
City over 100,000	300	4	6,500	2
City 10,000-99,999	200	3	23,100	8
Town or city under 10,000	800	11	47,100	16
Rural area	2,200	30	58,100	20
On a farm	3,300	46	111,500	37
No answer	400	6	51,500	17
Total	7,200	100	297,800	100

[a]First 12 years of life.
(W) Fewer than 50 owners or less than 0.5 percent.

Table 10.—Estimated number of private owners and acres of commercial forest land owned, by period of ownership and geographic unit, Maryland, 1977

Period of ownership	Central		Southern		Lower Eastern Shore		Western		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
					OWNERS					
Fewer than 5 years	25,100	39	2,400	29	1,400	9	3,400	43	32,300	34
5-9 years	7,200	11	1,400	17	1,700	11	700	9	11,000	12
10-24 years	16,600	26	2,200	27	5,500	35	2,500	31	26,800	28
25-49 years	6,900	11	1,300	16	5,400	34	1,100	14	14,700	15
Over 50 years	1,600	3	300	5	300	1	100	1	2,300	2
No answer	6,500	10	500	6	1,500	10	200	2	8,700	9
Total	63,900	100	8,100	100	15,800	100	8,000	100	95,800	100
					ACRES OWNED					
Fewer than 5 years	218,800	22	48,300	13	69,100	14	79,700	20	415,900	18
5-9 years	107,500	11	48,100	13	39,300	8	37,700	9	232,600	10
10-24 years	336,500	33	121,300	33	113,300	23	141,100	35	712,200	31
25-49 years	177,200	17	95,500	26	184,600	37	77,900	20	535,200	24
Over 50 years	73,800	7	37,600	10	54,800	11	43,000	11	209,200	9
No answer	101,700	10	16,700	5	34,100	7	22,400	5	174,900	8
Total	1,015,500	100	367,500	100	495,200	100	401,800	100	2,280,000	100

Table 11.—Estimated number of individual owners and acres of commercial forest land owned, by period of ownership and geographic unit, Maryland, 1977

Period of ownership	Central		Southern		Lower Eastern Shore		Western		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
					OWNERS					
Fewer than 5 years	21,900	40	2,400	33	1,200	8	3,400	48	28,900	35
5-9 years	6,600	12	1,300	18	1,600	11	700	10	10,200	12
10-24 years	15,200	28	1,900	26	5,400	38	1,900	27	24,400	29
25-49 years	6,800	13	1,200	16	4,500	32	800	11	13,300	16
Over 50 years	1,100	2	300	4	200	1	200	1	1,800	2
No Answer	2,700	5	200	3	1,400	10	200	3	4,500	6
Total	54,300	100	7,300	100	14,300	100	7,200	100	83,100	100
					ACRES OWNED					
Fewer than 5 years	167,800	23	33,300	12	46,900	14	72,800	24	320,800	20
5-9 years	69,100	9	27,700	10	33,700	10	26,100	9	156,600	10
10-24 years	272,700	37	101,200	38	105,300	31	103,300	35	582,500	35
25-49 years	144,900	20	76,700	28	111,200	33	56,200	19	389,000	24
Over 50 years	35,400	5	20,200	8	13,000	4	23,500	8	92,100	5
No answer	46,500	6	10,600	4	28,100	8	15,900	5	101,100	6
Total	736,400	100	269,700	100	338,200	100	297,800	100	1,642,100	100

Table 12.—Estimated number of private owners and acres of commercial forest land owned, by distance from tracts and number of tracts owned, Maryland, 1977

Distance (miles)	Distance from nearest tract		Distance from farthest track				
			1 tract	2 tracts	3 or more tracts	Total	
	Number	*Percent*	*Number*	*Number*	*Number*	*Number*	*Percent*
					OWNERS		
Residence to 1	57,200	60	48,600	4,600	1,800	55,000	58
2-5	8,300	9	5,500	2,400	1,100	9,000	9
6-15	5,000	5	4,000	800	700	5,500	6
16-25	3,100	3	3,000	600	200	3,800	4
26-50	4,000	4	3,000	800	300	4,100	4
Over 50	10,500	11	8,900	700	1,100	10,700	11
No answer	7,700	8	7,700	W	W	7,700	8
Total	95,800	100	80,700	9,900	5,200	95,800	100
					ACRES OWNED		
Residence to 1	1,259,100	55	810,800	128,300	105,700	1,044,800	46
2-5	296,100	13	96,100	71,900	110,400	278,400	12
6-15	178,500	8	70,400	55,700	83,000	209,100	9
16-25	89,800	4	60,700	18,000	47,500	126,200	6
26-50	114,400	5	63,900	21,900	73,100	158,900	7
Over 50	233,800	10	107,800	39,900	206,800	354,500	15
No answer	108,300	5	68,600	900	38,600	108,100	5
Total	2,280,000	100	1,278,300	336,600	665,100	2,280,000	100

(W) Fewer than 50 owners or less than 0.5 percent.

Table 13.—Estimated number of private owners and acres of commercial forest land owned, by primary reason for owning and harvesters and nonharvesters, Maryland, 1977

Primary reason for owning	Private owners		Acres owned	
	Number	*Percent*	*Number*	*Percent*
		HARVESTERS		
Land investment	2,300	2	149,500	7
Recreational use	400	1	54,700	2
Timber production	1,100	1	257,500	11
Farm and domestic use	3,300	4	115,100	5
Esthetic enjoyment	3,000	3	74,900	3
Part of farm	7,100	7	340,800	15
Part of residence	1,900	2	74,700	3
Other	200	W	78,200	4
No answer	1,800	2	65,500	3
Total	21,100	22	1,210,900	53
		NONHARVESTERS		
Land investment	12,800	14	218,200	9
Recreational use	8,700	9	70,400	3
Timber production	500	1	10,800	1
Farm and domestic use	3,700	4	112,300	5
Esthetic enjoyment	10,900	11	143,000	7
Part of farm	14,900	16	280,100	12
Part of residence	16,800	17	126,400	6
Other	2,500	2	58,800	2
No answer	3,900	4	49,100	2
Total	74,700	78	1,069,100	47
		ALL PRIVATE OWNERS		
Land investment	15,100	16	367,700	16
Recreational use	9,100	10	125,100	5
Timber production	1,600	2	268,300	12
Farm and domestic use	7,000	8	227,400	10
Esthetic enjoyment	13,900	14	217,900	10
Part of farm	22,000	23	620,900	27
Part of residence	18,700	19	201,100	9
Other	2,700	2	137,000	6
No answer	5,700	6	114,600	5
Total	95,800	100	2,280,000	100

(W) Less than 0.5 percent or fewer than 50 owners.

Table 14.—Estimated number of private owners and acres of commercial forest land owned, by primary reason for owning and harvesters and nonharvesters, Central geographic unit, Maryland, 1977

Primary reason for owning	Private owners		Acres owned	
	Number	*Percent*	*Number*	*Percent*
		HARVESTERS		
Land investment	1,500	2	30,800	3
Recreational use	100	W	26,200	3
Timber production	600	1	36,900	4
Farm and domestic use	2,200	3	51,100	5
Esthetic enjoyment	1,800	3	38,900	4
Part of farm	3,800	6	164,300	16
Part of residence	1,000	2	33,600	3
Other	200	W	32,800	3
No answer	500	1	16,900	2
Total	11,700	18	431,500	43
		NONHARVESTERS		
Land investment	8,900	14	119,300	12
Recreational use	7,500	12	32,800	3
Timber production	400	1	4,500	W
Farm and domestic use	1,700	3	50,000	5
Esthetic enjoyment	8,000	12	82,700	8
Part of farm	11,000	17	173,000	17
Part of residence	10,500	16	76,300	8
Other	600	1	24,600	2
No answer	3,600	6	20,800	2
Total	52,200	82	584,000	57
		ALL PRIVATE OWNERS		
Land investment	10,400	16	150,100	15
Recreational use	7,600	12	59,000	6
Timber production	1,000	2	41,400	4
Farm and domestic use	3,900	6	101,100	10
Esthetic enjoyment	9,800	15	121,600	12
Part of farm	14,800	23	337,300	33
Part of residence	11,500	18	109,900	11
Other	800	1	57,400	5
No answer	4,100	7	37,700	4
Total	63,900	100	1,015,500	100

(W) Less than 0.5 percent or fewer than 50 owners.

Table 15.—Estimated number of private owners and acres of commercial forest land owned, by primary reason for owning and harvesters and nonharvesters, Southern geographic unit, Maryland, 1977

Primary reason for owning	Private owners		Acres owned	
	Number	*Percent*	*Number*	*Percent*
		HARVESTERS		
Land investment	100	1	26,400	7
Recreational use	W	W	2,800	1
Timber production	W	W	14,000	4
Farm and domestic use	500	6	43,700	12
Esthetic enjoyment	300	4	14,700	4
Part of farm	1,100	14	69,300	19
Part of residence	200	2	16,600	4
Other	W	W	14,300	4
No answer	200	2	9,900	3
Total	2,400	29	211,700	58
		NONHARVESTERS		
Land investment	400	5	46,500	13
Recreational use	400	5	13,900	4
Timber production	100	1	2,700	1
Farm and domestic use	900	11	25,000	7
Esthetic enjoyment	900	11	12,200	3
Part of farm	900	11	27,700	7
Part of residence	1,800	23	16,700	5
Other	300	4	8,300	2
No answer	W	W	2,800	W
Total	5,700	71	155,800	42
		ALL PRIVATE OWNERS		
Land investment	500	6	72,900	20
Recreational use	400	5	16,700	5
Timber production	100	1	16,700	5
Farm and domestic use	1,400	17	68,700	19
Esthetic enjoyment	1,200	15	26,900	7
Part of farm	2,000	25	97,000	26
Part of residence	2,000	25	33,300	9
Other	300	4	22,600	6
No answer	200	2	12,700	3
Total	8,100	100	367,500	100

(W) Fewer than 50 owners or less than 0.5 percent.

Table 16.—Estimated number of private owners and acres of commercial forest land owned, by primary reason for owning and harvesters and nonharvesters, Lower Eastern Shore geographic unit, Maryland, 1977

Primary reason for owning	Private owners		Acres owned	
	Number	*Percent*	*Number*	*Percent*
		HARVESTERS		
Land investment	400	3	62,000	13
Recreational use	W	W	6,400	1
Timber production	300	2	148,000	30
Farm and domestic use	200	1	12,600	3
Esthetic enjoyment	100	1	5,600	1
Part of farm	1,300	8	61,500	12
Part of residence	700	4	24,500	5
Other	W	W	12,700	3
No answer	900	6	12,500	2
Total	3,900	25	345,800	70
		NONHARVESTERS		
Land investment	3,100	19	22,500	4
Recreational use	700	4	8,400	2
Timber production	W	W	3,600	1
Farm and domestic use	200	2	11,200	2
Esthetic enjoyment	1,200	7	14,000	3
Part of farm	1,700	11	53,300	11
Part of residence	3,900	25	20,300	4
Other	1,100	7	11,200	2
No answer	W	W	4,900	1
Total	11,900	75	149,400	30
		ALL PRIVATE OWNERS		
Land investment	3,500	22	84,500	17
Recreational use	700	4	14,800	3
Timber production	300	2	151,600	31
Farm and domestic use	400	3	23,800	5
Esthetic enjoyment	1,300	8	19,600	4
Part of farm	3,000	19	114,800	23
Part of residence	4,600	29	44,800	9
Other	1,100	7	23,900	5
No answer	900	6	17,400	3
Total	15,800	100	495,200	100

(W) Fewer than 50 owners or less than 0.5 percent.

Table 17.—Estimated number of private owners and acres of commercial forest land owned, by primary reason for owning and harvesters and nonharvesters, Western geographic unit, Maryland, 1977

Primary reason for owning	Private owners		Acres owned	
	Number	*Percent*	*Number*	*Percent*
		HARVESTERS		
Land investment	300	4	30,300	8
Recreational use	300	4	19,300	5
Timber production	200	2	58,600	15
Farm and domestic use	400	5	7,700	2
Esthetic enjoyment	800	10	15,700	4
Part of farm	900	11	45,700	11
Part of residence	—	—	—	—
Other	W	W	18,400	4
No answer	200	3	26,200	6
Total	3,100	39	221,900	55
		NONHARVESTERS		
Land investment	400	5	29,900	7
Recreational use	100	1	15,300	4
Timber production	—	—	—	—
Farm and domestic use	900	11	26,100	7
Esthetic enjoyment	800	10	34,100	8
Part of farm	1,300	17	26,100	7
Part of residence	600	8	13,100	3
Other	500	6	14,700	4
No answer	300	3	20,600	5
Total	4,900	61	179,900	45
		ALL PRIVATE OWNERS		
Land investment	700	9	60,200	15
Recreational use	400	5	34,600	9
Timber production	200	2	58,600	15
Farm and domestic use	1,300	16	33,800	9
Esthetic enjoyment	1,600	20	49,800	12
Part of farm	2,200	28	71,800	18
Part of residence	600	8	13,100	3
Other	500	6	33,100	8
No answer	500	6	46,800	11
Total	8,000	100	401,800	100

(W) Fewer than 50 owners or less than 0.5 percent.

Table 18.—Estimated number of private owners and acres of commercial forest land owned, by primary and secondary reason for owning, Maryland, 1977

Reason for owning	Primary reason		Secondary reason	
	Number	*Percent*	*Number*	*Percent*
		OWNERS		
Land investment	15,100	16	2,000	2
Recreational use	9,100	10	9,200	10
Timber production	1,600	2	2,700	3
Farm and domestic use	7,000	8	9,100	9
Esthetic enjoyment	13,900	14	7,100	7
Part of farm	22,000	23	1,500	2
Part of residence	18,700	19	5,000	5
Other	2,700	2	500	1
No secondary reason given	—Not applicable—		53,000	55
No answer	5,700	6	5,700	6
Total	95,800	100	95,800	100
		ACRES OWNED		
Land investment	367,700	16	218,300	10
Recreational use	125,100	5	167,100	7
Timber production	268,300	12	157,600	7
Farm and domestic use	227,400	10	172,300	7
Esthetic enjoyment	217,900	10	199,600	9
Part of farm	620,900	27	81,700	4
Part of residence	201,700	9	84,300	4
Other	137,000	6	32,300	1
No secondary reason given	—Not applicable—		1,052,200	46
No answer	114,600	5	114,600	5
Total	2,280,000	100	2,280,000	100

Table 19.—Estimated number of private owners and acres of commercial forest land owned, by primary reason for owning and expected time of future harvest, Maryland, 1977

Primary reason for owning	Expected time of future harvest									
	Next 10 years		Indefinite		Never		No answer		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
					OWNERS					
Land investment	1,700	2	5,000	5	8,300	9	100	W	15,100	16
Recreational use	100	W	900	1	8,100	9	W	W	9,100	10
Timber production	700	1	700	1	200	W	W	W	1,600	2
Farm and domestic use	1,800	2	3,800	4	1,000	1	400	1	7,000	8
Esthetic enjoyment	1,000	1	3,900	4	8,700	9	300	W	13,900	14
Part of farm	1,900	2	11,000	12	8,800	9	300	W	22,000	23
Part of residence	600	W	11,300	12	6,100	6	700	1	18,700	19
Other	100	W	500	W	2,100	2	W	W	2,700	2
No answer	W	W	100	W	1,100	1	4,500	5	5,700	6
Total	7,900	8	37,200	39	44,400	46	6,300	7	95,800	100
					ACRES OWNED					
Land investment	98,700	4	158,100	7	104,500	5	6,500	W	367,800	16
Recreational use	28,300	1	58,200	2	35,800	2	2,800	W	125,100	5
Timber production	211,800	9	29,100	1	10,100	1	17,400	1	268,400	12
Farm and domestic use	49,900	2	120,900	5	39,800	2	16,800	1	227,400	10
Esthetic enjoyment	20,800	1	92,600	5	90,900	4	13,600	W	217,900	10
Part of farm	144,500	6	318,400	14	140,400	6	17,600	1	620,900	27
Part of residence	20,200	1	119,600	5	45,500	2	15,600	1	200,900	9
Other	35,500	2	52,900	2	47,600	2	1,000	W	137,000	6
No answer	9,400	1	12,200	1	22,500	W	70,500	3	114,600	5
Total	619,100	27	962,000	42	537,100	24	161,800	7	2,280,000	100

(W) Fewer than 50 owners or less than 0.5 percent.

Table 20.—Estimated number of private owners and acres of commercial forest land owned, by primary benefit derived in the last 5 years, primary benefit expected in the next 5 years, and harvesters and nonharvesters, Maryland, 1977

Primary benefit	Derived in last 5 years				Expected in next 5 years			
	Private owners		Acres owned		Private owners		Acres owned	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				HARVESTERS				
Recreational use	600	1	80,500	3	1,300	1	98,900	4
Sale of timber	3,300	3	315,800	14	3,000	3	282,100	12
Land value increase	4,300	5	293,000	13	5,000	5	309,100	14
Esthetic enjoyment	4,100	4	179,600	8	4,200	5	154,000	7
Farm and domestic use	5,700	6	176,400	8	3,500	4	172,600	8
Other	W	W	56,500	2	200	W	51,300	2
No answer	3,100	3	109,100	5	3,900	4	142,900	6
Total	21,100	22	1,210,900	53	21,100	22	1,210,900	53
				NONHARVESTERS				
Recreational use	12,100	12	98,400	5	2,800	3	81,100	4
Sale of timber	—	—	—	—	500	W	13,700	1
Land value increase	12,100	12	237,600	10	14,800	15	287,300	12
Esthetic enjoyment	25,300	27	359,500	16	35,000	37	358,500	16
Farm and domestic use	15,400	17	225,200	10	11,700	12	212,700	9
Other	1,200	1	47,100	2	700	1	26,400	1
No answer	8,600	9	101,300	4	9,200	10	89,400	4
Total	74,700	78	1,069,100	47	74,700	78	1,069,100	47
				ALL PRIVATE OWNERS				
Recreational use	12,700	13	178,900	8	4,100	4	180,000	8
Sale of timber	3,300	3	315,800	14	3,500	3	295,800	13
Land value increase	16,400	17	530,600	23	19,800	21	596,400	26
Esthetic enjoyment	29,400	31	539,100	24	39,200	41	512,500	23
Farm and domestic use	21,100	23	401,600	18	15,200	16	385,300	17
Other	1,200	1	103,600	4	900	1	77,700	3
No answer	11,700	12	210,400	9	13,100	14	232,300	10
Total	95,800	100	2,280,000	100	95,800	100	2,280,000	100

(W) Less than 0.5 percent or fewer than 50 owners.

Table 21.—Estimated number of private owners and acres of commercial forest land owned, by primary benefit derived in the last 5 years, primary benefit expected in the next 5 years, and harvesters and nonharvesters, Central geographic unit, Maryland, 1977

Primary benefit	Derived in last 5 years				Expected in next 5 years			
	Private owners		Acres owned		Private owners		Acres owned	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				HARVESTERS				
Recreational use	300	1	35,800	4	700	1	40,700	4
Sale of timber	1,900	3	71,800	7	2,500	4	65,200	7
Land value increase	2,900	5	117,600	12	2,600	4	104,700	10
Esthetic enjoyment	2,200	3	96,600	10	2,800	5	92,200	9
Farm and domestic use	3,300	5	59,500	6	1,600	2	56,100	6
Other	W	W	23,900	2	200	W	25,300	2
No answer	1,100	1	26,300	2	1,300	2	47,300	5
Total	11,700	18	431,500	43	11,700	18	431,500	43
				NONHARVESTERS				
Recreational use	7,800	12	46,000	4	1,200	2	34,100	3
Sale of timber	—	—	—	—	400	1	4,500	W
Land value increase	7,800	12	112,600	11	7,200	11	146,000	15
Esthetic enjoyment	18,000	28	208,000	20	28,300	44	219,000	22
Farm and domestic use	11,900	19	136,000	13	8,400	13	118,700	11
Other	1,100	2	34,400	4	600	1	18,100	2
No answer	5,600	9	47,000	5	6,100	10	43,600	4
Total	52,200	82	584,000	57	52,200	82	584,000	57
				ALL PRIVATE OWNERS				
Recreational use	8,100	13	81,800	8	1,900	3	74,800	7
Sale of timber	1,900	3	71,800	7	2,900	5	69,700	7
Land value increase	10,700	17	230,200	23	9,800	15	250,700	25
Esthetic enjoyment	20,200	31	304,600	30	31,100	49	311,200	31
Farm and domestic use	15,200	24	195,500	19	10,000	15	174,800	17
Other	1,100	2	58,300	6	800	1	43,400	4
No answer	6,700	10	73,300	7	7,400	12	90,900	9
Total	63,900	100	1,015,500	100	63,900	100	1,015,500	100

(W) Less than 0.5 percent or fewer than 50 owners.

Table 22—Estimated number of private owners and acres of commercial forest land owned, by primary benefit derived in the last 5 years, primary benefit expected in the next 5 years, and by harvesters and nonharvesters, Southern geographic unit, Maryland, 1977

Primary benefit	Derived in last 5 years				Expected in next 5 years			
	Private owners		Acres owned		Private owners		Acres owned	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				HARVESTERS				
Recreational use	100	1	16,600	4	100	1	18,000	5
Sale of timber	200	2	36,800	10	100	1	23,800	7
Land value increase	300	4	41,800	11	400	5	47,800	13
Esthetic enjoyment	400	5	31,200	9	400	5	26,800	7
Farm and domestic use	1,100	13	55,500	15	700	8	55,500	15
Other	W	W	6,000	2	W	W	3,200	1
No answer	300	4	23,800	7	700	9	36,600	10
Total	2,400	29	211,700	58	2,400	29	211,700	58
				NONHARVESTERS				
Recreational use	400	5	17,400	5	400	5	11,100	3
Sale of timber	—	—	—	—	—	—	—	—
Land value increase	500	6	42,900	12	600	7	50,800	14
Esthetic enjoyment	3,300	41	53,900	14	3,000	37	45,600	12
Farm and domestic use	900	11	25,000	7	800	11	22,200	6
Other	W	W	5,500	1	100	1	6,700	2
No answer	600	8	11,100	3	800	10	19,400	5
Total	5,700	71	155,800	42	5,700	71	155,800	42
				ALL PRIVATE OWNERS				
Recreational use	500	6	34,000	9	500	6	29,100	8
Sale of timber	200	2	36,800	10	100	1	23,800	7
Land value increase	800	10	84,700	23	1,000	12	98,600	27
Esthetic enjoyment	3,700	46	85,100	23	3,400	42	72,400	19
Farm and domestic use	2,000	24	80,500	22	1,500	19	77,700	21
Other	W	W	11,500	3	100	1	9,900	3
No answer	900	12	34,900	10	1,500	19	56,000	15
Total	8,100	100	367,500	100	8,100	100	367,500	100

(W) Less than 0.5 percent or fewer than 50 owners.

Total
(W) Less than 0.5 percent or fewer than 50 owners.

Table 23.—Estimated number of private owners and acres of commercial forest land owned, by primary benefit derived in the last 5 years, primary benefit expected in the next 5 years, and harvesters and nonharvesters, Lower Eastern Shore geographic unit, Maryland, 1977

Primary benefit	Derived in last 5 years				Expected in next 5 years			
	Private owners		Acres owned		Private owners		Acres owned	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				HARVESTERS				
Recreational use	100	1	10,300	2	100	1	10,200	2
Sale of timber	700	4	164,500	33	200	1	150,500	30
Land value increase	400	2	83,000	17	1,300	8	101,300	21
Esthetic enjoyment	100	1	17,600	4	100	1	20,400	4
Farm and domestic use	1,100	7	40,700	8	900	6	33,700	7
Other	W	W	4,500	1	W	W	4,500	1
No answer	1,500	10	25,200	5	1,300	8	25,200	5
Total	3,900	25	345,800	70	3,900	25	345,800	70
				NONHARVESTERS				
Recreational use	3,800	24	19,600	4	900	5	14,000	3
Sale of timber	—	—	—	—	100	1	9,200	2
Land value increase	3,600	23	65,200	13	6,300	40	54,000	10
Esthetic enjoyment	2,100	13	30,900	6	2,100	13	33,700	7
Farm and domestic use	200	1	12,000	3	300	2	19,600	4
Other	100	1	5,600	1	—	—	—	—
No answer	2,100	13	16,100	3	2,200	14	18,900	4
Total	11,900	75	149,400	30	11,900	75	149,400	30
				ALL PRIVATE OWNERS				
Recreational use	3,900	25	29,900	6	1,000	6	24,200	5
Sale of timber	700	4	164,500	33	300	2	159,700	32
Land value increase	4,000	25	148,200	30	7,600	48	155,300	31
Esthetic enjoyment	2,200	14	48,500	10	2,200	14	54,100	11
Farm and domestic use	1,300	8	52,700	11	1,200	8	53,300	11
Other	100	1	10,100	2	W	W	4,500	1
No answer	3,600	23	41,300	8	3,500	22	44,100	9
Total	15,800	100	495,200	100	15,800	100	495,200	100

(W) Less than 0.5 percent or fewer than 50 owners.

Table 24.—Estimated number of private owners and acres of commercial forest land owned, by primary benefit derived in the last 5 years, primary benefit expected in the next 5 years, and harvesters and nonharvesters, Western geographic unit, Maryland, 1977

Primary benefit	Derived in last 5 years				Expected in next 5 years			
	Private owners		Acres owned		Private owners		Acres owned	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				HARVESTERS				
Recreational use	100	1	17,800	4	400	5	30,000	7
Sale of timber	500	6	42,700	11	200	2	42,600	11
Land value increase	700	9	50,600	13	700	9	55,300	13
Esthetic enjoyment	1,400	18	34,200	8	900	11	14,600	4
Farm and domestic use	200	3	20,700	5	300	4	27,300	7
Other	W	W	22,100	6	W	W	18,300	5
No answer	200	2	33,800	8	600	8	33,800	8
Total	3,100	39	221,900	55	3,100	39	221,900	55
				NONHARVESTERS				
Recreational use	100	1	15,400	4	300	4	21,900	6
Sale of timber	—	—	—	—	—	—	—	—
Land value increase	200	2	16,900	4	700	9	36,500	9
Esthetic enjoyment	1,900	24	66,700	17	1,600	20	60,200	15
Farm and domestic use	2,400	30	52,200	13	2,200	27	52,200	13
Other	W	W	1,600	W	W	W	1,600	W
No answer	300	4	27,100	7	100	1	7,500	2
Total	4,900	61	179,900	45	4,900	61	179,900	45
				ALL PRIVATE OWNERS				
Recreational use	200	2	33,200	8	700	9	51,900	13
Sale of timber	500	6	42,700	11	200	2	42,600	11
Land value increase	900	11	67,500	17	1,400	18	91,800	22
Esthetic enjoyment	3,300	42	100,900	25	2,500	31	74,800	19
Farm and domestic use	2,600	33	72,900	18	2,500	31	79,500	20
Other	W	W	23,700	6	W	W	19,900	5
No answer	500	6	60,900	15	700	9	41,300	10
Total	8,000	100	401,800	100	8,000	100	401,800	100

(W) Less than 0.5 percent or fewer than 50 owners.

(W) Less than 0.5 percent or fewer than 50 owners.

Table 25.—Estimated number of private owners and acres of commercial forest land owned, by primary benefit expected in the next 5 years and expected time of future harvest, Maryland, 1977

Primary benefit	Expected time of future harvest									
	Next 10 years		Indefinite		Never		No answer		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
					OWNERS					
Recreational use	800	1	1,600	1	1,700	2	—	—	4,100	4
Sale of timber	3,100	3	300	W	—	—	100	W	3,500	3
Land value increase	1,000	1	5,700	7	13,000	13	100	W	19,800	21
Esthetic enjoyment	1,100	1	17,100	18	20,500	21	500	1	39,200	41
Farm and domestic use	1,800	2	9,800	10	3,000	3	600	1	15,200	16
Other	W	W	200	W	700	1	—	—	900	1
No answer	100	W	2,500	3	5,500	6	5,000	5	13,100	14
Total	7,900	8	37,200	39	44,400	46	6,300	7	95,800	100
					ACRES OWNED					
Recreational use	59,900	2	85,000	4	35,100	2	—	—	180,000	8
Sale of timber	253,700	12	27,500	1	—	—	14,100	W	295,300	13
Land value increase	151,900	6	275,500	12	148,600	7	20,900	1	596,900	26
Esthetic enjoyment	40,600	2	265,100	12	187,600	8	19,200	1	512,500	23
Farm and domestic use	66,800	3	222,900	10	75,900	3	19,600	1	385,200	17
Other	28,800	1	23,700	1	25,300	1	—	—	77,800	3
No answer	17,400	1	62,300	2	64,600	3	88,000	4	232,300	10
Total	619,100	27	962,000	42	537,100	24	161,800	7	2,280,000	100

(W) Less than 0.5 percent or fewer than 50 owners.

Table 26.—Estimated number of private owners who have harvested timber and acres of commercial forest land owned, by reason for harvesting and form of ownership, Maryland, 1977

Reason for harvesting	Individual[a]		Corporation		Other[b]		All forms of ownership	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				HARVESTERS				
Timber mature	4,500	24	100	20	100	6	4,700	22
Good price	1,200	6	100	20	100	6	1,400	7
Land clearing	1,500	8	W	W	500	28	2,000	10
Needed money	5,000	26	W	W	700	39	5,700	27
Own/company use	3,300	18	W	W	100	5	3,400	16
Timber salvage	400	2	W	W	100	5	500	2
Cultural treatment	100	1	W	W	—	—	100	W
Other	600	3	200	40	W	W	800	4
No answer	2,100	12	100	20	300	11	2,500	12
Total	18,700	100	500	100	1,900	100	21,100	100
				ACRES OWNED				
Timber mature	317,200	38	95,800	37	36,500	31	449,500	37
Good price	65,100	8	16,400	6	9,600	8	91,100	8
Land clearing	58,800	7	11,600	4	15,400	13	85,800	7
Needed money	182,000	22	14,700	6	23,300	20	220,000	18
Own/company use	82,800	10	89,100	34	11,200	10	183,100	15
Timber salvage	32,300	4	5,700	2	6,700	6	44,700	4
Cultural treatment	13,100	2	3,100	1	—	—	16,200	1
Other	11,800	1	7,700	3	4,400	4	23,900	2
No answer	70,100	8	17,400	7	9,100	8	96,600	8
Total	833,200	100	261,500	100	116,200	100	1,210,900	100

[a]Includes joint ownership.
[b]Includes partnerships, undivided estates, clubs, associations, etc.
(W) Less than 0.5 percent or fewer than 50 owners.

Table 27.—Estimated number of private owners who have harvested timber and acres of commercial forest land owned, by reason for harvesting and geographic unit, Maryland, 1977

Reason for harvesting	Central		Southern		Lower Eastern Shore		Western		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
					HARVESTERS					
Timber mature	2,900	25	600	25	700	18	500	16	4,700	22
Good price	200	2	300	13	500	13	400	13	1,400	7
Land clearing	1,300	11	100	4	400	11	200	7	2,000	10
Needed money	2,900	25	900	37	1,300	34	600	19	5,700	27
Own/company use	2,200	19	400	17	200	5	600	19	3,400	16
Timber salvage	W	W	100	4	400	8	—	—	500	2
Cultural treatment	W	W	—	—	—	—	100	3	100	W
Other	600	5	W	W	—	—	200	7	800	4
No answer	1,600	13	W	W	400	11	500	16	2,500	12
Total	11,700	100	2,400	100	3,900	100	3,100	100	21,100	100
					ACRES OWNED					
Timber mature	193,800	45	63,000	30	127,500	37	65,200	30	449,500	37
Good price	32,600	8	13,900	7	25,700	7	18,900	8	91,100	8
Land clearing	17,100	4	16,000	8	23,900	7	28,800	13	85,800	7
Needed money	78,200	18	67,700	32	44,800	13	29,300	13	220,000	18
Own/company use	51,200	12	36,100	17	76,500	22	19,300	9	183,100	15
Timber salvage	1,100	W	6,700	3	36,900	11	—	—	44,700	4
Cultural treatment	3,100	1	—	—	—	—	13,100	6	16,200	1
Other	10,200	2	2,800	1	—	—	10,900	5	23,900	2
No answer	44,200	10	5,500	2	10,500	3	36,400	16	96,600	8
Total	431,500	100	211,700	100	345,800	100	221,900	100	1,210,900	100

(W) Less than 0.5 percent or fewer than 50 owners.

Table 28.—Estimated number of private owners who have not harvested timber and acres of commercial forest land owned, by reason for not harvesting and form of ownership, Maryland, 1977

Reason for not harvesting	Individual[a]		Corporation		Other[b]		All forms of ownership	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
				NONHARVESTERS				
Timber immature	10,400	16	400	7	400	9	11,200	15
Destroy hunting	9,100	14	W	W	—	—	9,100	12
Selling the land	2,400	4	300	5	100	2	2,800	4
Ruin scenery	11,000	17	700	12	500	11	12,200	17
Land in estate	100	W	—	—	900	20	1,000	1
Opposed to harvesting	1,800	3	—	—	—	—	1,800	2
Poor quality	300	W	—	—	1,900	41	2,200	3
Low volume	9,800	15	100	2	W	W	9,900	13
Insufficient area	7,200	11	500	9	100	2	7,800	10
Other	6,200	10	500	9	400	9	7,100	10
No answer	6,100	10	3,200	56	300	6	9,600	13
Total	64,400	100	5,700	100	4,600	100	74,700	100
				ACRES OWNED				
Timber immature	183,400	23	31,500	20	30,900	30	245,800	23
Destroy hunting	42,400	5	2,200	1	—	—	44,600	4
Selling the land	34,700	4	12,500	8	6,300	6	53,500	5
Ruin scenery	154,600	19	50,400	32	13,800	13	218,800	21
Land in estate	4,500	1	—	—	5,600	5	10,100	1
Opposed to harvesting	20,900	3	—	—	—	—	20,900	2
Poor quality	12,100	1	—	—	3,700	4	15,800	1
Low volume	74,600	9	15,000	10	2,800	3	92,400	9
Insufficient area	54,000	7	4,600	3	4,400	4	63,000	6
Other	149,400	18	29,600	19	17,400	17	196,400	18
No answer	78,300	10	10,100	7	19,400	18	107,800	10
Total	808,900	100	155,900	100	104,300	100	1,069,100	100

[a]Includes joint ownerships.
[b]Includes partnerships, undivided estates, clubs, associations, etc.
(W) Less than 0.5 percent or fewer than 50 owners.

Table 29.—Estimated number of private owners who have not harvested timber and acres of commercial forest land owned, by reason for not harvesting and geographic unit, Maryland, 1977

Reason for not harvesting	Central		Southern		Lower Eastern Shore		Western		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
					NONHARVESTERS					
Timber immature	7,100	14	1,300	23	1,400	12	1,400	29	11,200	15
Destroy hunting	8,400	16	300	5	300	2	100	2	9,100	12
Selling the land	2,500	5	100	2	100	1	100	2	2,800	4
Ruin scenery	9,400	18	300	5	1,100	9	1,400	29	12,200	17
Land in estate	100	W	W	W	900	8	—	—	1,000	1
Opposed to harvesting	1,700	3	W	W	100	1	—	—	1,800	2
Poor quality	1,900	4	200	4	100	1	—	—	2,200	3
Low volume	4,500	8	1,400	24	3,300	28	700	14	9,900	13
Insufficient area	5,900	11	—	—	1,600	13	300	6	7,800	10
Other	4,500	9	1,700	30	100	1	800	16	7,100	10
No answer	6,200	12	400	7	2,900	24	100	2	9,600	13
Total	52,200	100	5,700	100	11,900	100	4,900	100	74,700	100
					ACRES OWNED					
Timber immature	107,900	18	42,400	27	44,900	30	50,600	28	245,800	23
Destroy hunting	13,600	2	11,100	7	5,600	4	14,300	8	44,600	4
Selling the land	33,100	6	8,300	5	5,600	4	6,500	4	53,500	5
Ruin scenery	149,100	26	10,300	7	25,300	17	34,100	19	218,800	21
Land in estate	4,500	1	2,800	2	2,800	2	—	—	10,100	1
Opposed to harvesting	15,300	3	2,800	2	2,800	2	—	—	20,900	2
Poor quality	7,400	1	2,800	2	5,600	4	—	—	15,800	1
Low volume	47,000	8	5,500	3	20,300	13	19,600	11	92,400	9
Insufficient area	48,100	8	—	—	8,400	5	6,500	4	63,000	6
Other	98,000	17	55,900	36	14,800	10	27,700	15	196,400	18
No answer	60,000	10	13,900	9	13,300	9	20,600	11	107,800	10
Total	584,000	100	155,800	100	149,400	100	179,900	100	1,069,100	100

(W) Less than 0.5 percent or fewer than 50 owners.

Table 30.—Expected number of private owners and acres of commercial forest land owned, by expected time of future harvest and harvesters and nonharvesters, Maryland, 1977

Expected time of future harvest	Private owners		Acres owned	
	Number	*Percent*	*Number*	*Percent*
		HARVESTERS		
Next 5 years	4,000	4	411,700	18
5-10 years	600	1	67,700	3
Indefinite	10,500	11	505,400	22
Never	4,300	4	117,000	5
No answer	1,700	2	109,100	5
Total	21,100	22	1,210,900	53
		NONHARVESTERS		
Next 5 years	1,700	2	98,700	4
5-10 years	1,400	1	41,100	2
Indefinite	26,700	28	456,600	20
Never	40,100	42	420,100	19
No answer	4,800	5	52,600	2
Total	74,700	78	1,069,100	47
		ALL PRIVATE OWNERS		
Next 5 years	5,700	6	510,400	22
5-10 years	2,000	2	108,800	5
Indefinite	37,200	39	962,000	42
Never	44,400	46	537,100	24
No answer	6,500	7	161,700	7
Total	95,800	100	2,280,000	100

Table 31.—Expected number of private owners and acres of commercial forest land owned, by expected time of future harvest and harvesters and nonharvesters, Central geographic unit, Maryland, 1977

Expected time of future harvest	Private owners		Acres owned	
	Number	*Percent*	*Number*	*Percent*
		HARVESTERS		
Next 5 years	3,600	6	139,100	14
5-10 years	100	W	9,600	1
Indefinite	5,600	9	190,300	19
Never	1,500	2	48,300	5
No answer	900	1	44,200	4
Total	11,700	18	431,500	43
		NONHARVESTERS		
Next 5 years	1,400	2	48,300	4
5-10 years	1,100	2	30,000	3
Indefinite	20,000	31	240,300	24
Never	25,500	40	236,300	23
No answer	4,200	7	29,100	3
Total	52,200	82	584,000	57
		ALL PRIVATE OWNERS		
Next 5 years	5,000	8	187,400	18
5-10 years	1,200	2	39,600	4
Indefinite	25,600	40	430,600	43
Never	27,000	42	284,600	28
No answer	5,100	8	73,300	7
Total	63,900	100	1,015,500	100

(W) Less than 0.5 percent.

Table 32.—Expected number of private owners and acres of commercial forest land owned, by expected time of future harvest and harvesters and nonharvesters, Southern geographic unit, Maryland, 1977

Expected time of future harvest	Private owners		Acres owned	
	Number	*Percent*	*Number*	*Percent*
		HARVESTERS		
Next 5 years	200	2	34,800	9
5-10 years	200	2	23,700	7
Indefinite	1,400	17	99,800	27
Never	300	4	36,000	10
No answer	300	4	17,400	5
Total	2,400	29	211,700	58
		NONHARVESTERS		
Next 5 years	W	W	2,800	1
5-10 years	200	3	5,500	1
Indefinite	2,900	36	85,600	23
Never	2,200	27	50,800	14
No answer	400	5	11,100	3
Total	5,700	71	155,800	42
		ALL PRIVATE OWNERS		
Next 5 years	200	2	37,600	10
5-10 years	400	5	29,200	8
Indefinite	4,300	53	185,400	50
Never	2,500	31	86,800	24
No answer	700	9	28,500	8
Total	8,100	100	367,500	100

(W) Less than 0.5 percent or fewer than 50 owners.

Table 33.—Expected number of private owners and acres of commercial forest land owned, by expected time of future harvest and harvesters and nonharvesters, Lower Eastern Shore geographic unit, Maryland, 1977

Expected time of future harvest	Private owners		Acres owned	
	Number	*Percent*	*Number*	*Percent*
		HARVESTERS		
Next 5 years	100	1	181,400	36
5-10 years	300	2	28,000	6
Indefinite	1,800	11	103,200	21
Never	1,400	9	19,700	4
No answer	300	2	13,500	3
Total	3,900	25	345,800	70
		NONHARVESTERS		
Next 5 years	200	1	17,600	4
5-10 years	100	1	5,600	1
Indefinite	1,500	9	61,700	12
Never	10,000	63	59,600	12
No answer	100	1	4,900	1
Total	11,900	75	149,400	30
		ALL PRIVATE OWNERS		
Next 5 years	300	2	199,000	40
5-10 years	400	3	33,600	7
Indefinite	3,300	20	164,900	33
Never	11,400	72	79,300	16
No answer	400	3	18,400	4
Total	15,800	100	495,200	100

Table 34.—Expected number of private owners and acres of commercial forest land owned, by expected time of future harvest and harvesters and nonharvesters, Western geographic unit, Maryland, 1977

Expected time of future harvest	Private owners		*Acres owned*	
	Number	*Percent*	*Number*	*Percent*
		HARVESTERS		
Next 5 years	100	2	56,400	14
5-10 years	W	W	6,400	2
Indefinite	1,700	21	112,100	28
Never	1,100	13	13,000	3
No answer	200	3	34,000	8
Total	3,100	39	221,900	55
		NONHARVESTERS		
Next 5 years	100	1	30,000	8
5-10 years	—	—	—	—
Indefinite	2,300	29	69,000	17
Never	2,400	30	73,400	18
No answer	100	1	7,500	2
Total	4,900	61	179,900	45
		ALL PRIVATE OWNERS		
Next 5 years	200	3	86,400	22
5-10 years	W	W	6,400	2
Indefinite	4,000	50	181,100	45
Never	3,500	43	86,400	21
No answer	300	4	41,500	10
Total	8,000	100	401,800	100

(W) Less than 0.5 percent or fewer than 50 owners.

TABLE 33.—Estimated number of private owners and acres of commercial forest land owned, by size class and expected time of future harvest, Maryland, 1977

Size class (in acres)	Expected time of future harvest									
	Next 10 years		Indefinite		Never		No answer		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
					OWNERS					
1-9	2,000	2	18,000	19	28,900	30	3,700	4	52,600	55
10-19	2,200	2	5,800	6	8,400	9	1,100	1	17,500	18
20-49	1,500	2	9,300	10	5,200	4	600	1	16,600	17
50-99	1,100	1	2,200	2	1,400	2	600	1	5,300	6
100-199	600	1	1,200	1	400	1	200	W	2,400	3
200-499	400	W	600	1	100	W	100	W	1,200	1
500+	100	W	100	W	W	W	W	W	200	W
Total	7,900	8	37,200	39	44,400	46	6,300	7	95,800	100
					ACRES OWNED					
1-9	7,400	W	65,400	3	86,200	4	10,800	W	169,800	7
10-19	25,400	1	77,400	3	104,600	5	17,500	1	224,900	10
20-49	48,600	2	262,800	11	154,500	7	20,300	1	486,200	21
50-99	72,900	3	153,800	7	92,200	4	38,600	2	357,500	16
100-199	73,000	4	155,700	7	55,300	2	24,800	1	308,800	14
200-499	110,200	5	172,100	8	31,300	1	29,700	1	343,300	15
500+	281,700	12	74,800	3	13,000	1	20,000	1	389,500	17
Total	619,200	27	962,000	42	537,100	24	161,700	7	2,280,000	100

(W) Less than 0.5 percent or fewer than 50 owners.

Table 36.—Estimated number of private owners who have harvested timber and acres of commercial forest land owned, by individual selecting timber and method of selecting timber, Maryland, 1977

Individual or method of selecting timber	Harvesters		Acres owned	
	Number	*Percent*	*Number*	*Percent*
Individual				
Landowner	6,700	32	401,800	33
Forester	2,600	12	226,600	19
Friend	200	1	14,200	1
Buyer	6,400	30	293,100	24
Landowner and forester	1,400	7	103,100	9
Landowner and buyer	1,500	7	70,300	6
Other	200	1	23,700	2
No answer	2,100	10	78,100	6
Total	21,100	100	1,210,900	100
Method				
Selection	4,600	22	204,300	17
Diameter limit	5,900	28	336,500	28
Clearcutting	1,500	7	306,700	25
Land clearing	1,500	7	54,500	5
Combination of Methods	1,800	9	76,100	6
Other	1,100	5	55,600	5
Don't know	2,300	11	87,100	7
No answer	2,400	11	90,100	7
Total	21,100	100	1,210,900	100

Table 37.—Estimated number of private owners who have harvested timber and acres of commercial forest land owned, by timber product harvested, Maryland, 1977

Timber product	Harvesters		Acres owned	
	Number	*Percent*	*Number*	*Percent*
Sawlog	8,500	40	369,000	31
Veneer	1,000	5	10,700	1
Pulpwood	1,400	7	92,600	8
Pole, post, piling	900	4	24,600	2
1 other product	1,400	7	39,300	3
Sawlog and veneer	800	4	72,800	6
Sawlog and pulpwood	1,300	6	89,900	8
Sawlog and pole, post, piling	800	4	75,000	6
Another 2-product combination	800	4	42,000	3
3 products	1,200	5	136,400	11
4 or more products	600	3	148,800	12
Don't know	900	4	44,700	4
No answer	1,500	7	65,100	5
Total	21,100	100	1,210,900	100

Table 38.—Estimated number of private owners and acres of commercial forest land owned, by agency that owners would contact for forestry assistance, Maryland, 1977

Agency	Private owners		Acres owned	
	Number	*Percent*	*Number*	*Percent*
County/state	18,100	19	806,700	35
Soil Conservation Service	1,600	2	38,500	2
Forest Service	400	W	21,400	1
Agricultural Stabilization and Conservation Service	500	W	37,700	2
Consulting or industrial forester	200	W	128,300	6
Cooperative Extension Service	6,000	6	88,300	4
Other	1,500	2	5,900	W
Don't know	48,800	51	736,300	32
No answer	18,700	20	416,900	18
Total	95,800	100	2,280,000	100

(W) Less than 0.5 percent or fewer than 50 owners.

Table 39.—Estimated number of private owners who have received forestry assistance and acres of commercial forest land owned, by type of assistance, Maryland, 1977

Type of assistance	Assisted owners		Acres owned	
	Number	*Percent*	*Number*	*Percent*
Timber marking	800	1	79,800	4
Timber stand improvement	900	1	70,600	3
Tree planting	3,900	4	194,100	8
Timber sales administration	1,300	1	62,600	3
Insect and disease control	400	W	10,400	W
Timber evaluation	500	1	28,600	1
Surveying	400	W	76,200	3
General forest management	1,700	2	272,000	12
Other	1,100	1	49,700	2
Service not specified	2,300	2	106,400	5
Total receiving assistance[a]	11,800	12	805,400	35

[a]Columns do not add to totals because some owners received more than one service.
(W) Less than 0.5 percent or fewer than 50 owners.

Table 40.—Estimated number of private owners and acres of commercial forest land owned by type of public use permitted, Maryland, 1977

Type of public use	Private owners		Acres owned	
	Number	*Percent*	*Number*	*Percent*
Hiking	8,600	9	503,300	22
Picnicking	4,600	5	319,700	14
Camping	1,900	2	266,000	12
Fishing	5,900	6	294,900	13
Hunting	18,100	19	749,400	33
Other	2,300	2	155,800	7
All types[a]	24,600	26	973,700	43
Public use not permitted	62,200	65	1,104,400	48
No answer	9,000	9	202,900	9
Total	95,800	100	2,280,000	100

[a] Columns do not add to totals because some owners permit more than one type of public use.

Table 41.—Estimated number of private owners who have posted their land and acres of commercial forest land owned, by reason for posting, Maryland, 1977

Reason for posting	Private owners		Acres owned	
	Number	*Percent*	*Number*	*Percent*
Abuse of property	2,400	3	143,700	6
Safety	2,500	3	72,800	3
Liability	300	W	18,400	1
Control access	17,000	18	427,100	19
Control hunting	12,700	13	366,700	16
Reason not specified	4,100	4	166,500	7
All reasons	39,000	41	1,195,200	52
Land not posted	49,500	52	928,500	41
No answer	7,300	7	156,300	7
Total	95,800	100	2,280,000	100

(W) Less than 0.5 percent or fewer than 50 owners.

Table 42.—Estimated number of individual owners and acres of commercial forest land owned, by membership in conservation-related organizations, Maryland, 1977

Organization membership	Individual owners		Acres owned	
	Number	*Percent*	*Number*	*Percent*
American Forestry Association	1,200	1	75,200	5
Izaak Walton League	700	1	15,500	1
Audubon Society	1,900	2	60,000	4
National Wildlife Federation	16,500	20	213,500	13
A sportsman's club	9,400	11	162,700	10
Farmer organization	4,900	6	158,700	10
American Tree Farm	300	W	118,100	7
Other	4,600	6	228,900	14
Some memberships	27,600	33	579,900	35
No memberships	51,100	62	923,200	56
No answer	4,400	5	139,000	9
Total[a]	83,100	100	1,642,100	100

[a]Columns do not add to totals because some owners belong to more than one organization.
(W) Less than 0.5 percent or fewer than 50 owners.

Table 43.—Estimated number of individual owners and acres of commercial forest land owned, by conservation-oriented publications they receive, Maryland, 1977

Publications received	Individual owners		Acres owned	
	Number	*Percent*	*Number*	*Percent*
American Forests	1,200	1	75,200	5
National Wildlife	16,500	20	213,500	13
Pennsylvania Game News	7,300	9	50,400	3
Audubon Magazine	2,100	3	60,000	4
Field and Stream	6,300	8	214,700	13
Sports Afield	8,700	10	167,300	10
Ranger Rick	11,100	13	67,900	4
Maryland Conservation	2,800	3	125,600	8
Pennsylvania Farmer	5,900	7	157,600	10
Other	5,700	7	200,600	12
Some subscriptions	36,100	43	749,100	46
No subscriptions	41,700	50	752,700	46
No answer	5,300	6	140,300	9
Total[a]	83,100	100	1,642,100	100

[a]Columns do not add to totals because some owners subscribe to more than one publication.

Table 44.—Estimated number of individual owners and acres of commercial forest land owned, by statement and response to statement of conservation quiz, Maryland, 1977

Statement number	Correct answer	Percent correct	Response to statement				
			True	False	Don't know	No answer	All responses
			INDIVIDUAL OWNERS				
1	True	83	68,900	400	5,400	8,400	83,100
2	False	68	10,000	56,600	7,300	9,200	83,100
3	True	52	43,300	2,700	27,200	9,900	83,100
4	False	29	21,200	24,200	28,500	9,200	83,100
5	False	67	4,000	55,900	14,100	9,100	83,100
6	False	11	46,200	9,200	18,100	9,600	83,100
7	False	19	29,900	15,700	27,900	9,600	83,100
8	True	17	14,100	7,500	47,900	13,600	83,100
9	False	49	18,600	40,400	14,400	9,700	83,100
10	True	31	25,500	7,300	40,400	9,900	83,100
			ACRES OWNED				
1	True	83	1,364,000	6,400	86,400	185,300	1,642,100
2	False	68	207,400	1,116,700	124,100	193,900	1,642,100
3	True	58	949,600	37,300	399,400	255,800	1,642,100
4	False	36	476,100	586,000	374,100	205,900	1,642,100
5	False	69	39,600	1,131,500	265,600	205,400	1,642,100
6	False	16	873,500	262,300	297,800	208,500	1,642,100
7	False	22	569,600	365,300	492,600	214,600	1,642,100
8	True	15	250,400	109,500	1,008,900	273,300	1,642,100
9	False	45	466,100	734,200	221,200	220,600	1,642,100
10	True	49	806,100	73,900	538,000	224,100	1,642,100

Table 45.—Estimated number of individual owners and acres of commercial forest land owned, by response to conservation quiz, Maryland, 1977

Responses	Individual owners		Acres owned	
	Number	*Percent*	*Number*	*Percent*
Percent/correct				
0	1,800	2	18,500	1
10	2,000	3	64,700	4
20	2,600	3	51,500	3
30	8,600	11	170,700	10
40	16,100	19	250,700	15
50	14,300	17	213,900	13
60	12,300	15	243,900	15
70	7,600	9	193,400	12
80	5,200	6	130,200	8
90	1,700	2	91,700	6
100	100	W	12,900	1
All who answered 10 statements	72,300	87	1,442,100	88
All who had 10 "don't knows"	2,800	3	26,500	2
All who answered no statements	8,000	10	170,700	10
All who had mixed responses	W	W	2,800	W
Total	83,100	100	1,642,100	100

(W) Less than 0.5 percent or fewer than 50 owners.

Kingsley, Neal P., and Thomas W. Birch.
1980. **The forest-land owners of Maryland.** Northeast For. Exp. Stn., Broomall, Pa.
78 p. (USDA For. Serv. Resour. Bull NE-63)

A statistical analytical report of a mail canvass of the owners of privately owned commercial forest land in Maryland. The study was conducted in conjunction with the third forest survey of Maryland by the USDA Forest Service. Statistical findings are based on responses supplied by owners to a mail questionnaire. Trends in forest-land ownership and the attitudes and intentions of owners regarding reasons for owning forest land, timber management, timber harvesting, recreational use, etc. are discussed.

923.9:(752)

Keywords: Available timber, harvesting, forestry assistance, recreation

Kingsley, Neal P., and Thomas W. Birch.
1980. **The forest-land owners of Maryland.** Northeast For. Exp. Stn., Broomall, Pa.
78 p. (USDA For. Serv. Resour. Bull NE-63)

A statistical analytical report of a mail canvass of the owners of privately owned commercial forest land in Maryland. The study was conducted in conjunction with the third forest survey of Maryland by the USDA Forest Service. Statistical findings are based on responses supplied by owners to a mail questionnaire. Trends in forest-land ownership and the attitudes and intentions of owners regarding reasons for owning forest land, timber management, timber harvesting, recreational use, etc. are discussed.

923.9:(752)

Keywords: Available timber, harvesting, forestry assistance, recreation

Kingsley, Neal P., and Thomas W. Birch.
1980. **The forest-land owners of Maryland.** Northeast For. Exp. Stn., Broomall, Pa.
78 p. (USDA For. Serv. Resour. Bull NE-63)

A statistical analytical report of a mail canvass of the owners of privately owned commercial forest land in Maryland. The study was conducted in conjunction with the third forest survey of Maryland by the USDA Forest Service. Statistical findings are based on responses supplied by owners to a mail questionnaire. Trends in forest-land ownership and the attitudes and intentions of owners regarding reasons for owning forest land, timber management, timber harvesting, recreational use, etc. are discussed.

923.9:(752)

Keywords: Available timber, harvesting, forestry assistance, recreation

Kingsley, Neal P., and Thomas W. Birch.
1980. **The forest-land owners of Maryland.** Northeast For. Exp. Stn., Broomall, Pa.
78 p. (USDA For. Serv. Resour. Bull NE-63)

A statistical analytical report of a mail canvass of the owners of privately owned commercial forest land in Maryland. The study was conducted in conjunction with the third forest survey of Maryland by the USDA Forest Service. Statistical findings are based on responses supplied by owners to a mail questionnaire. Trends in forest-land ownership and the attitudes and intentions of owners regarding reasons for owning forest land, timber management, timber harvesting, recreational use, etc. are discussed.

923.9:(752)

Keywords: Available timber, harvesting, forestry assistance, recreation

GOVERNMENT PRI

Headquarters of the Northeastern Forest Experiment Station are in Broomall, Pa. Field laboratories and research units are maintained at:

- Amherst, Massachusetts, in cooperation with the University of Massachusetts.
- Beltsville, Maryland.
- Berea, Kentucky, in cooperation with Berea College.
- Burlington, Vermont, in cooperation with the University of Vermont.
- Delaware, Ohio.
- Durham, New Hampshire, in cooperation with the University of New Hampshire.
- Hamden, Connecticut, in cooperation with Yale University.
- Kingston, Pennsylvania.
- Morgantown, West Virginia, in cooperation with West Virginia University, Morgantown.
- Orono, Maine, in cooperation with the University of Maine, Orono.
- Parsons, West Virginia.
- Princeton, West Virginia.
- Syracuse, New York, in cooperation with the State University of New York College of Environmental Sciences and Forestry at Syracuse University, Syracuse.
- University Park, Pennsylvania, in cooperation with the Pennsylvania State University.
- Warren, Pennsylvania.

UDC 792:83(771)

by Robert L. Nevel, Jr.
and Robert B. Redett

GOVT. DOCUMENTS
DEPOSITORY ITEM

DEC 10 1980

CLEMSON
LIBRARY

OHIO Timber Industries—a Periodic Assessment of Timber Output

CLEMSON UNIVERSITY LIBRARY
DEC 11 1980
SCI., TECH. & AGR. DIV.

USDA FOREST SERVICE RESOURCE BULLETIN NE-64
1980

FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE
NORTHEASTERN FOREST EXPERIMENT STATION
370 REED ROAD, BROOMALL, PA 19008

Cover Photo

Tree shearing is an uncommon timber harvesting practice in Ohio. It is a highly versatile means of removing timber, especially in the northern and central regions of Ohio where slopes are mostly less than 30 percent. Shearing is particularly adapted to group-selection harvesting systems, which are favored for attaining considerable increases in production over other conventional systems. Production often reaches 20 tons of wood per hour under favorable terrain and stocking conditions. This method may be used for single-tree selection cutting, but the chain saw is generally more efficient and practical.

The Authors

ROBERT L. NEVEL, JR., forester, received a B.S. degree in forest technology in 1965 from The Pennsylvania State University and an M.S. degree in wood technology in 1968 from Yale University. In 1968 he joined the Northeastern Forest Experiment Station's Forestry Sciences Laboratory at Princeton, West Virginia, where he was engaged in research on the economic efficiency of hardwood resources use in secondary manufactured products. In 1978 he joined the Northeastern Station at Broomall, Pennsylvania, where he is working in the timber-removals phase of Forest Resources Evaluation.

ROBERT B. REDETT, Assistant Chief of the Division of Forestry of the Ohio Department of Natural Resources, received a degree in forestry from Michigan State University in 1942. In 1946 he joined the Ohio Division of Forestry, serving in the field as Acquisition Forester and District Forester. In 1953 he was assigned to the Division's headquarters in Columbus, where he has served in a series of staff positions relating to fire protection, timber management, reforestation, and utilization and marketing.

MANUSCRIPT RECEIVED FOR PUBLICATION 12 JUNE 1980

Abstract

A periodic evaluation of industrial timber output in Ohio based on a statewide survey of the primary wood manufacturing plants. Contains statistics on the industrial timber harvest and plant wood receipts in 1978, and the production and disposition of the manufacturing residues that resulted. The 74 million cubic feet (ft^3) or 2.2 million cubic meters (m^3) of industrial wood produced in 1978 represented an 8-percent decrease in production since the previous survey in 1973. Although production of pulpwood, veneer logs, and cooperage logs increased during the period, sawlog and mine timber production decreased. Other trends in industrial product output and use of manufacturing residue are presented.

CONTENTS

HIGHLIGHTS 1
BACKGROUND 2
CURRENT INDUSTRY TRENDS 2
INDUSTRIAL TIMBER HARVEST 3
LUMBER AND SAWLOG INDUSTRIES 6
PULPWOOD INDUSTRIES 8
OTHER TIMBER INDUSTRIES 10
- Veneer logs 10
- Cooperage logs 11
- Miscellaneous products 11

MANUFACTURING RESIDUES 12
LITERATURE CITED 13
DEFINITION OF TERMS 14
- Species 14
- Harvest 14
- Manufacture 14
- Residues 14

INDEX TO TABLES 15

HIGHLIGHTS

THE 1978 TIMBER INDUSTRY survey in Ohio showed that since 1973:

- Total timber output has decreased by 8 percent to 74 million ft^3.
- Sawlog production has declined by 8 percent to 322 million board feet.
- The number of sawmills in Ohio has increased from 310 to 326—there has been an increase in high-production mills and a decrease in low-production mills.
- Total pulpwood production has increased less than 1 percent to 372,000 cords—total-tree chip production has increased while the use of logs and chipped residues for pulpwood has decreased.
- Veneer- and cooperage-log production has increased by 21 percent to 14.8 million board feet.
- The use of wood manufacturing residues has increased from 79 to 84 percent of the total available.

BACKGROUND

THE FOREST SERVICE of the U.S. Department of Agriculture conducts continuing forest surveys of all states to provide up-to-date information on the Nation's timber and timber-related resources. In the 14-state region served by the Northeastern Forest Experiment Station, all states have now been surveyed at least twice. Ohio has now been inventoried for the third time. A part of the latest survey completed in 1979 included a timber-industry survey to determine the output of timber products and the volume and disposition of primary wood-product manufacturing residues.

This report is the result of a 100-percent canvass of all primary wood-product manufacturers that were operating in Ohio in 1978. Pulpwood production data were gathered as part of the Northeastern Station's annual survey of pulpwood producers in the Northeast. The Ohio Division of Forestry assembled a list of all known primary wood-product manufacturing firms for the canvass. The primary manufacturers were initially contacted through a questionnaire that was mailed from Northeastern Station headquarters. Possible out-of-state consumers of Ohio roundwood also received questionnaires. After three mailings, those mill owners in Ohio who did not respond were contacted in person by Ohio Division of Forestry personnel; nonresponding out-of-state primary manufacturers were contacted by telephone by Station personnel.

This report for the most part deals with statistics for 2 years: 1978, the calendar year of the current timber-industry survey, and 1973, the calendar year of the previous complete canvass. The reader is reminded that these years may not be representative for the various Ohio timber industries covered in this report. When documented production statistics were available for individual timber products for previous or intervening years, they were included for comparative purposes.

Long-term production trends will be forthcoming from future surveys. Until a data base is built up over time, the reader is cautioned to use the current statistics prudently.

CURRENT INDUSTRY TRENDS

Ohio's timberlands contain mostly hardwood trees of valuable species such as red and white oak, black cherry, white ash, hard and soft maple, and yellow-poplar. Statewide, more than 95 percent of the forests are hardwood, mostly oaks, maples, and yellow-poplar. Most of the forests are located in the state's hilly eastern and southern regions, which are noted for fine hardwood timber and good timber-growing sites.

During the late 18th century, most of the timber that was cut was piled and burned to make land available for agricultural purposes. The best timber was used for building, fuel, fencing, and cooperage. Many high-grade oak trees were felled for tanbark. The sawlogs

were cut into lumber at water-powered sawmills.

In the 1800's, industry flourished in Ohio and much hardwood was used to make charcoal, railroad ties, mine timbers, and construction materials. Quality hardwood timber was cut to make furniture, tools, and farm implements. Many of the logs were now sawed into lumber at coal or wood-fired, steam-powered sawmills.

By the 20th century, most of Ohio's timberlands had been cleared. The forest products industry was dominated by small, portable, steam-powered sawmills and lumber production had peaked. Major products in the early 1900's remained much the same as in the 1800's. The markets were larger as population and industry grew.

During the last quarter century, the timber and timber products industry in Ohio changed considerably to provide a more complete use of the timber resource. Larger, more efficient harvesting and processing equipment was developed to provide a larger variety of specialized timber products to larger, more efficient mills producing a variety of secondary products. Chain saws, rubber-tired skidders, mechanical harvesters, knuckle-boom loaders, and total-tree systems were used to provide logs, bolts, and chips to high-capacity sawmills, veneer mills, pallet mills, and pulpmills. A variety of economic opportunities such as energy cost savings, reduction in equipment maintenance, increases in productivity, and changing bark and pulpwood markets have prompted mills to install debarkers, chippers, and wood-burning power plants. Revitalization and upgrading of the rail systems increased demand for wood railroad ties. During the past decade, increased amounts of wood fiber and bark were substituted for oil and gas in home heating plants throughout Ohio. Producers of diverse wood products such as veneer and lumber were consolidated with other local, regional, and national enterprises to add flexibility and financial stability to their operation. A favorable monetary rate stimulated export demand and domestic prices for quality hardwood logs, lumber, and veneer.

Environmental concerns will bring about further future energy needs and new technology changes in timber harvesting and timber products, markets, and processing. Improved methods of forest management should be developed to provide the most complete use of Ohio's timber resource. More wood fiber from each forested acre should be recovered and channeled to the wood-using industry best suited to convert each class of roundwood into the most profitable products.

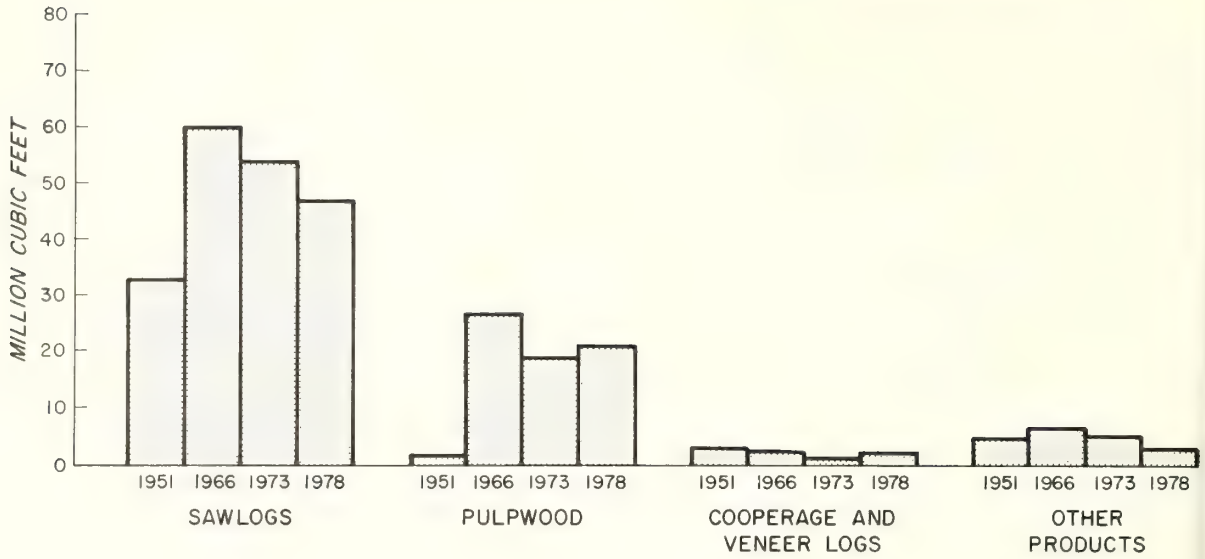
INDUSTRIAL TIMBER HARVEST

In 1978, 74 million ft^3 of timber were harvested from Ohio's forests for use by the timber industry. Hardwoods accounted for 97 percent of the harvested timber. Most of the timber was used for sawlogs, which accounted for 64 percent of the total harvest. Pulpwood production made up most of the remaining harvest—29 percent of the total. Veneer logs and cooperage logs each made up about 1½ percent of the harvest. The remaining 4 percent was used for mine timbers and miscellaneous timber products such as handle stock, metallurgical wood, poles, posts, pilings, and guardrails.

The major timber product—sawlogs—was primarily responsible for the 8-percent reduction in harvested timber between 1973 and 1978. The decrease in sawlog production was partially offset by a production increase in pulpwood, Ohio's other major timber product. Together, the cubic-foot volume of timber for sawlogs and pulpwood was 6 percent lower in 1978 than in 1973, a reduction of 4.2 million ft^3. Although the production of veneer logs and cooperage logs rose by 11 and 38 percent, respectively, the increase in production amounted to only 400,000 ft^3. The production of mine timbers and miscellaneous products decreased by 29 and 51 percent, respectively.

Although timber harvests in Ohio have been declining in recent years, they have continued to remain greater than in earlier years. The harvests of 1973 (80.5 million ft^3) and 1978 (74 million ft^3) were 83 and 68 percent higher, respectively, than that of 1951 when 44 million ft^3 were produced. Cubic-foot

Figure 1.—Trend in industrial timber harvest in Ohio for selected years, by product use.



sawlog production for Ohio in 1978 was about one-fourth less than the recent high of 1966. The downward trend in cooperage and veneer log production appears to have ended (Fig. 1). The production of miscellaneous products such as mine timbers has continued to fluctuate with cyclical increases and decreases in market demand.

In 1951, three-fourths of the timber harvest was in sawlogs and only 4 percent was in pulpwood. By 1966, only 62 percent was in sawlogs—pulpwood had increased to 28 percent of the harvest. Since 1966, the distribution of timber products has changed slightly. In 1978, sawlogs accounted for more of the harvest—64 percent of the total. Pulpwood has stabilized at about a fourth of the total harvest; all other products have remained at less than 8 percent.

For the 1973-78 period, changes in the distribution of Ohio's timber harvest among the various timber products were almost entirely a result of decreases or increases in the volumes of hardwood timber used to make the products. The volume of hardwoods in pulpwood, veneer logs, and cooperage logs showed increases of from 11 to 38 percent. The production of sawlogs, mine timbers, and miscellaneous products decreased by 14 to 69 percent.

During the 1973-78 period, the increases and decreases in the production of hardwood products were virtually offset so there was only a 10 percent decrease in the Ohio hardwood harvest, from 79.6 to 71.8 million ft^3. In 1978, the 7.5 million-ft^3 decrease in hardwood sawlog production from 53.9 to 46.4 million ft^3 accounted for most of the decline in both the hardwood product production and the timber harvest. The 2.9 million-ft^3 increase in the production of pulpwood and cooperage and veneer logs from hardwoods nearly offset a 3.2 million-ft^3 reduction in miscellaneous hardwood products and mine timbers. Hardwood pulpwood production increased from 18.5 to 21.0 million ft^3; hardwood veneer log output increased by 300,000 ft^3; and the production of cooperage logs increased by 100,000 ft^3. Mine timbers dropped by 300,000 ft^3 and miscellaneous hardwood products decreased by 2.9 million ft^3.

Most of Ohio's 1978 timber harvest was from the state's south-central, southeastern, and the east-central units (Fig. 2). Each unit accounted for about a fourth of the total harvest. As in 1973, these three units accounted for 73 percent of the timber harvest in Ohio. In 1978, two units showed increases in the timber harvest in Ohio. In 1978, two units

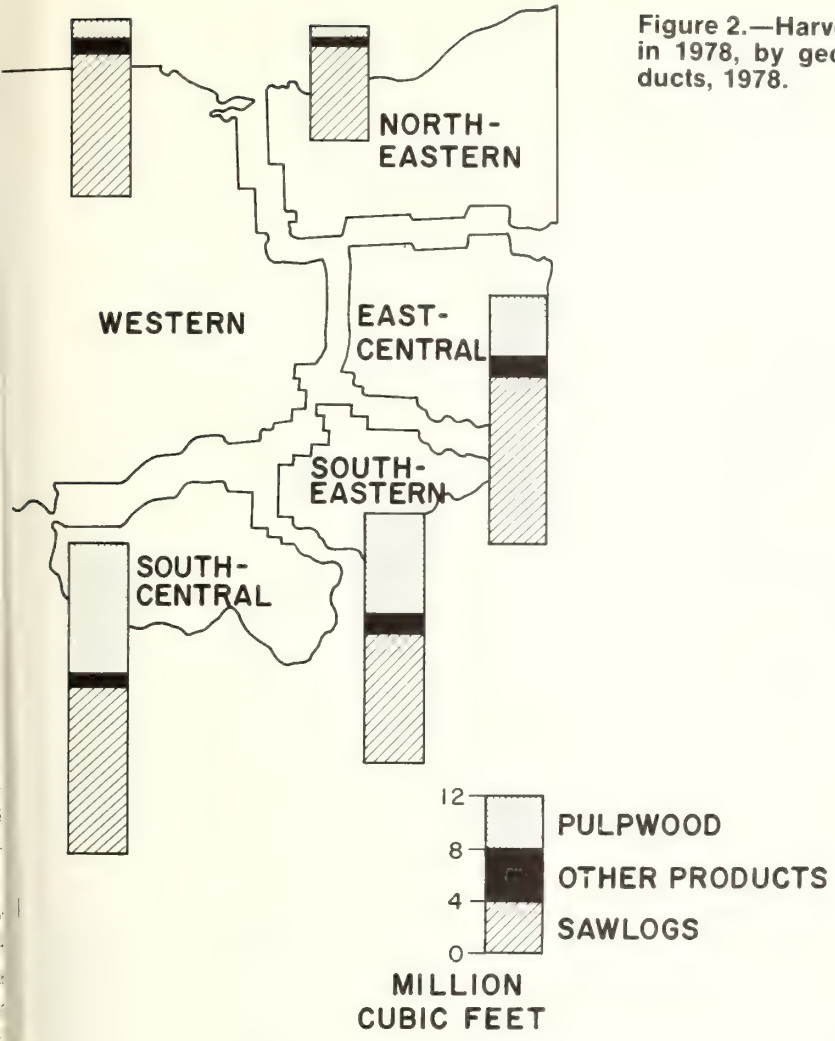


Figure 2.—Harvest of industrial timber in Ohio in 1978, by geographic unit and major products, 1978.

showed increases in the timber harvested over 1973; three units registered declines:

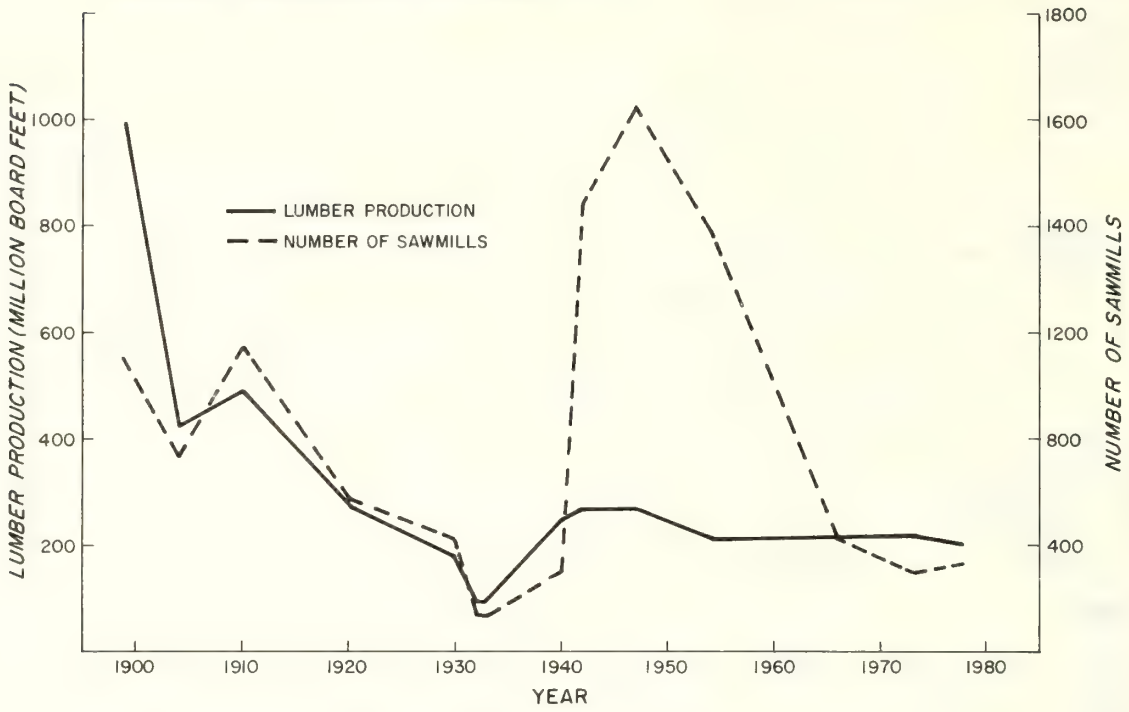
Geographic unit	*1973*	*1978*	*Change*
	(million ft³)		*(percent)*
South-Central	22.9	21.0	- 8
Southeastern	15.4	16.9	+10
East-Central	21.0	16.8	- 20
Northeastern	10.7	7.2	- 33
Western	10.5	12.1	+15
Total	80.5	74.0	- 8

The south- and east-central geographic units had the largest sawlog harvests in 1978. With individual sawlog harvests of slightly over 11 million ft³, each produced nearly 24 percent of the state's sawlogs. Sawlogs accounted for well over half of the timber harvest in each geographic unit—and more than 80 percent of the harvest for the northeastern and western units.

The south-central geographic unit also had the largest pulpwood harvest. Its 8.8 million ft³ of pulpwood accounted for 40 percent of its timber harvest and 40 percent of the state's pulpwood.

Most of the other products harvested in Ohio were rather evenly distributed among the state's five geographic units, with the exception of the northeastern unit. That unit had less than one-tenth of the state's total, while the others had 20 percent or more.

Figure 3.—Lumber production and number of sawmills in Ohio for selected years between 1899 and 1973.



Source: U.S. Dep. Commer., Bur. Census: Census of manufacturers 1961, 1966, 1971; Current industrial reports 1950, 1957, 1962, 1966, 1970, 1977, 1980; Steer 1948.

LUMBER AND SAWLOG INDUSTRIES

During the last three-quarters of this century, there have been major swings in annual lumber production and in the number of operating sawmills in Ohio (Fig. 3). Throughout most of this period, the number of sawmills operating in Ohio has generally followed fluctuations in lumber production (Steer 1948). In recent years, lumber production has stabilized as fewer mills share most of the annual production.

In 1899, nearly 1 billion board feet of lumber were produced by more than 1,000 sawmills. Much of this large production was a result of removing high-quality timber to clear land for agriculture. Both lumber production and the number of sawmills gradually declined over the next 30 years with the depletion of the original forests. As the Nation's economy collapsed between 1929 and 1933, the lumber production bottomed out. In 1932 and 1933, a low of 100 million board feet of lumber was produced annually by no more than 160 sawmills. In a third of a century, both lumber production and the number of operating sawmills had declined by almost 90 percent.

As the national economy improved, lumber production and the number of sawmills operating in Ohio increased. Stimulated by increased wartime demand for raw materials, lumber production almost tripled by 1942. It reached 270 million board feet and stayed at that level through 1947. By 1947, there were a record 1,644 sawmills.

In the 1950's, the circumstances that were responsible for the rapid changes in lumber demand of the 1930's and 1940's had largely disappeared. Annual production in Ohio reverted to the level of the 1920's where it has remained rather constant for more than 20 years. In 1954, production dropped to 214 million board feet and in 1973 had risen only by 3 percent to 221 million. This level of production represents the demand for lumber in

Ohio under normal economic conditions. During the 1973-78 period, lumber production in Ohio dropped by 9 percent, almost paralleling the drop in the state's sawlog harvest, to 201 million board feet.

While annual lumber production has changed little in recent years, the number of sawmills operating in Ohio has continued to drop until recently. There were 1,369 sawmills in 1954; 411 in 1966; 310 in 1973; and 326 in 1978.

As in most other regions of the country, an increasingly greater proportion of Ohio's lumber is produced by high-production sawmills; more than 1 million board feet of lumber is produced annually. These full-time stationary mills are replacing smaller, portable, part-time mills. From 1966 to 1978, the number of high-production mills increased from 39 to 120, while the number of low-production mills (less than 1 million board feet annually) declined from 146 to 108. In 1978, the 98 mills that were idle or operating only part-time (custom mills) represented less than half of the 226 such mills in 1966.

Three of the five geographic units of Ohio show a decrease in the number of operable sawmills both between 1966 and 1973 and between 1973 and 1978. The declines resulted from reductions in the number of low-production mills in each unit due to a number of these mills becoming idle or closing. Except for the east-central unit, the number of large sawmills increased throughout Ohio for both periods. In the east-central unit, the number of sawmills producing more than 1 million board feet annually increased from 10 to 18 for the 1966-73 period and dropped to 17 by 1978.

Since 1966, oak has accounted for an increasingly larger proportion of Ohio's sawlog harvest. In 1978, oak constituted over half of the annual production:

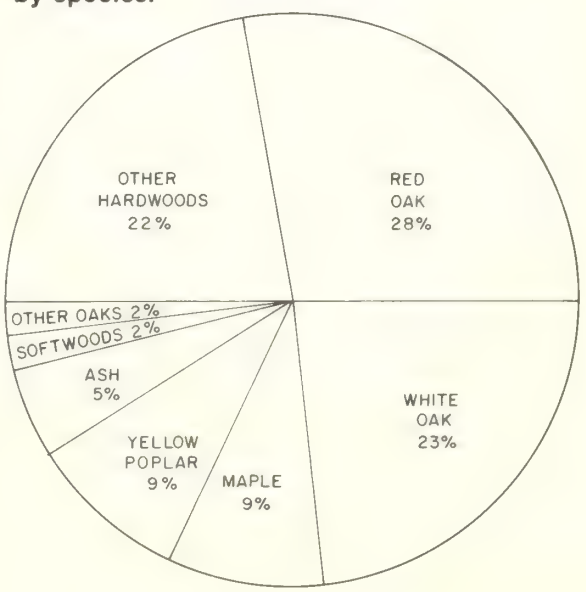
Species	*1966*	*1973*	*1978*
	------- *percent* -------		
Oak	43	47	53
Maple	14	12	9
Elm	4	2	1
Beech	5	7	4
Yellow-poplar	11	10	9
Other species	23	22	24

The percentage of total sawlog harvest accounted for by maple, elm, and yellow-poplar has declined as oak and other species gain in usage.

Sawlog production in 1978 was 322 million board feet—a drop of 8 percent from 1973 and 17 percent from 1966. In 1978, as in 1973, about half of the state's sawlogs were harvested in the east- and south-central units. The east-central unit accounted for 76.4 million board feet of sawlogs and the south-central unit produced 85.2 million board feet. In the south-central unit, sawlog production has increased by 4 percent since 1973, while dropping by 17 percent from 92 million board feet in the east-central unit. The northeastern unit had the largest decline—32 percent—from 62 to 42 million board feet, while the southeastern unit had the smallest—14 percent. From 1973 to 1978, the only other increase in sawlog production was in Ohio's western unit, where production rose by 24 percent to 63 million board feet after that unit had experienced the largest decline in the state during the 1966-73 period.

Ninety-eight percent of the total sawlog production in 1978 was from hardwood trees. Red oaks accounted for 28 percent and white oaks made up 23 percent (Fig. 4). Other important species included hard and soft maples,

Figure 4.—Ohio sawlog production in 1978, by species.



ash, yellow-poplar, and beech. Over four-fifths of the hardwood was processed in the same geographic unit from which it was harvested. About 16 percent was transported to other parts of the state for manufacture. The remaining hardwood sawlogs were processed out of the state.

Two-thirds of the softwood sawlog production was from Virginia and other yellow-pines. Most of the remainder was from white and red pine trees. Less than 2 percent was from hemlock and other species. Only 2 percent of the softwood sawlog harvest was processed out of the state. Over half was used in the region of manufacture; 42 percent was used in other parts of the state.

Total sawlog receipts at Ohio sawmills from both within and outside of the state have declined. The 342.5 million board feet received in 1978 was 4 percent less than in 1973 and 12 percent less than in 1966. During the 1973-78 period, sawlog receipts declined throughout the state in all but the south-central unit, where they rose by 32 percent.

The proportion of Ohio's sawlog production to total sawlog receipts also has declined in recent years. In 1966, sawlog production equalled nearly 100 percent of the state's receipts; in 1973, it was 98 percent; and by 1978 the volume of sawlogs produced in Ohio accounted for 94 percent of the sawlogs used in the state.

Ohio's sawmills have been relying more heavily on out-ot-state wood. In 1966 and 1973, only 2 percent of Ohio's total sawlog receipts were imported. In 1978, almost 9 percent of the state's sawlog receipts consisted of imported logs.

Except for the western unit, Ohio was a net importer of sawlogs in 1978. Less than 3 percent (8.3 million board feet) of the state's sawlog production was shipped out of the state. Most of the exported sawlogs went to Indiana and West Virginia, while most of the 29 million board feet of imported sawlogs were from West Virginia, Kentucky, and Pennsylvania.

PULPWOOD INDUSTRIES

Total pulpwood production, the roundwood harvest, and the use of chipped manufacturing residues in Ohio have grown over the past decade (Fig. 5). The 252,000 cords of roundwood and 120,000 cord equivalents of pulp chips produced in 1978 represent a gain of more than 24 percent from the 299,000 cords produced in 1969. Most of this rise is attributable to a 76-percent increase in chipped residue production (68,000 cords in 1969). The roundwood harvest increased only by 9 percent during the period.

Although Ohio's pulpwood harvest increased by 29,000 cords since 1973, the net increase in total pulpwood production for 1978 was little more than 2,000 cords. The volume of pulpwood from plant residues decreased by almost 27,000 cords between 1973 and 1978. The availability of plant residues for use as pulp chips is governed by the volume of roundwood processed by the state's wood manufacturers. From 1973 to 1978, the volume of pulp chips from manufacturing residues decreased by 18 percent as a result of a 4-percent decrease in sawlog receipts at Ohio roundwood processing plants. Additionally, use rates of chippable coarse residues were relatively high during the period. About 92 percent of the residues generated were recovered for fuel, pulp chips, charcoal, metallurgical chips, or other byproducts.

Total pulpwood production, chipped residue production, and roundwood production for 1978 were within several thousand cords of their respective averages for the 1973-78 period. In both 1978 and 1973, there were the same six pulpmills operating in Ohio with a combined total daily pulping capacity of 1,820 tons. This tonnage was up from 1,540 tons per day in 1969. The six pulpmills consumed 98 percent of the state's total pulpwood production in 1978. In addition, 126,000 cords of pulpwood were imported from other states. Only 7,000 cords of Ohio pulpwood were shipped out-of-state for pulping.

About 1 percent of Ohio's pulpwood production in 1978 was from softwood trees, two-thirds from hardwoods, and 32 percent from manufacturing residues (Fig. 6). The

Figure 5.—Pulpwood production in Ohio in 1969-78, by source.

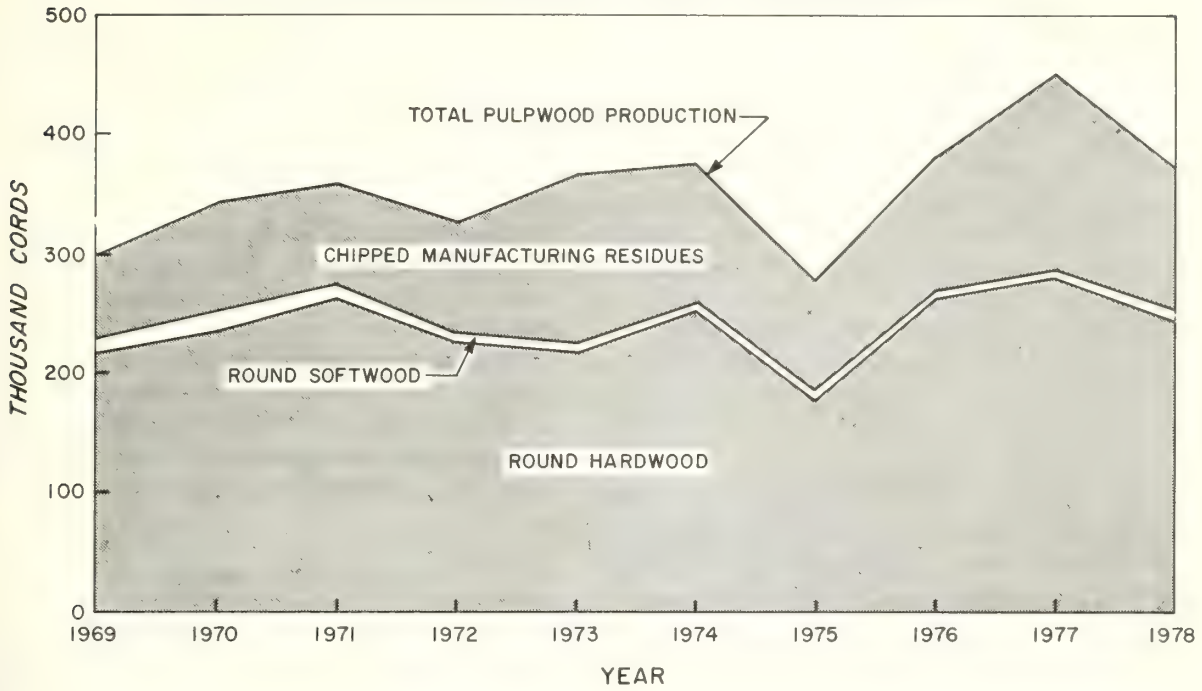
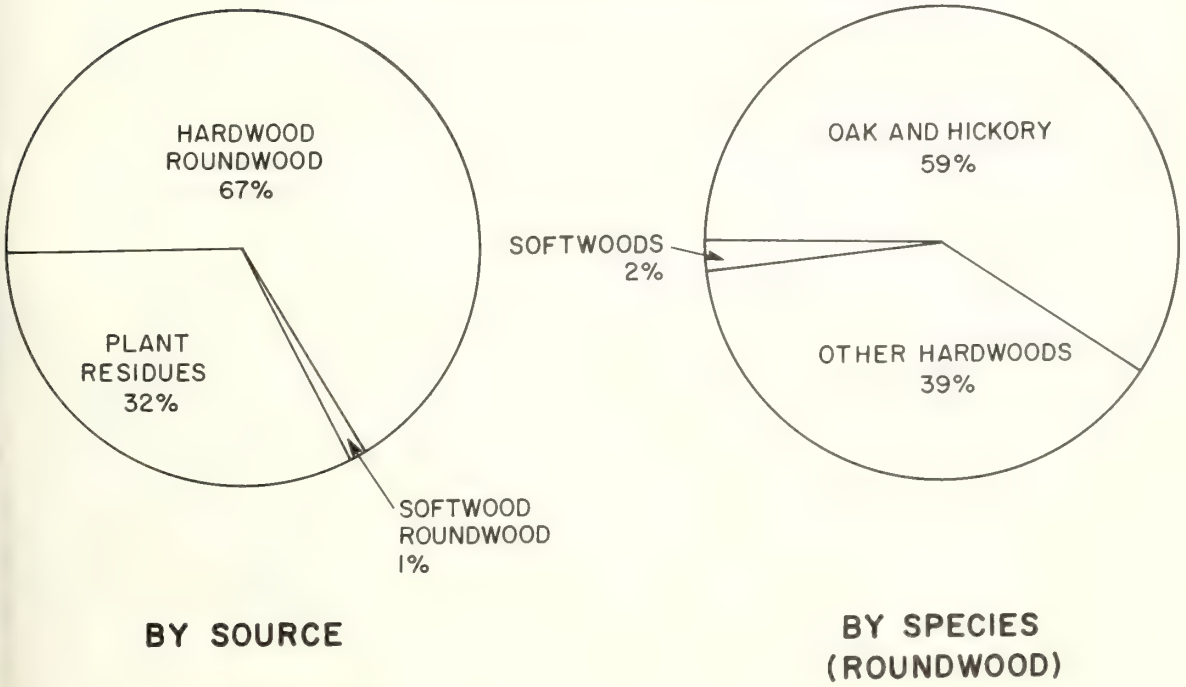


Figure 6.—Ohio pulpwood production in 1978.



entire softwood harvest was pine. Oak and hickory made up 59 percent of the total pulpwood harvest. Aspen, yellow-poplar, maple, beech, and birch accounted for most of the remaining harvest.

Nearly 4 million cords of pulpwood have been harvested from Ohio timberlands during the last 15 years (Table 15), an average of 257,000 cords per year. The 1978 harvest was 252,000 cords. During the last 15 years, the south-central unit has accounted for about 48 percent of the harvest. The southeastern and east-central units are other important pulpwood producing regions, each normally accounting for about one-fifth of the total harvest.

Since 1973, the pulpwood harvest has declined in the south-central unit and increased in the southeastern, accounting for 41 and 31 percent, respectively, of the state's 1978 harvest:

Geographic unit	*1973*	*1978*	*Change*
	(thousand cords)		*(percent)*
South-central	113.8	103.5	- 9
Southeastern	44.0	79.4	+80
East-central	39.6	48.5	+22
Northeastern	5.0	5.9	+18
Western	20.4	14.5	- 29
Total	222.8	251.8	+13

In 1978, the south-central unit registered 103,500 cords, slightly less than in 1973, and accounted for more of the state's 1978 pulpwood harvest than any other region—41 percent. With 79,400 cords in 1978, the southeastern unit nearly doubled its 1973 production. As in 1973, this region was the second highest producer of pulpwood in Ohio in 1978. From 1973 to 1978, the southeastern region registered the largest volume increase—80 percent—of any of the five regions in Ohio. The volume increase in the southeastern unit was made up entirely of hardwood pulpwood. The increase in hardwood pulpwood for the unit exceeded the total increase in pulpwood production for Ohio by 6,000 cords.

The use of total-tree chips from the stems, branches, and tops of hardwood trees has risen from 74,000 cords in 1974 to 196,000 cords in 1978. During the 1974-78 period, the proportion of total-tree chips to logs used for roundwood in Ohio was reversed. In 1974, total-tree chips accounted for less than one-third of the State's roundwood production; logs made up the remainder. In 1978, production from total-tree chips made up more than three-fourths of Ohio's roundwood production and over half of its pulpwood production. Rapid acceptance of this form of pulpwood has resulted in high per-acre yields of wood fiber, increased worker productivity, and increased recovery of small, rough and rotten trees at the harvest site.

OTHER TIMBER INDUSTRIES

Ohio has several small, stable, wood-using industries that use less than 10 percent of the state's annual timber harvest. Most of the timber harvested for these industries is used for products such as veneer and cooperage logs, handle stock, and mine timbers. Although most of these industries have exacting requirements and are willing to pay a premium for certain species, sizes, and other physical attributes, other users, such as the charcoal and electrometallurgical industries, are lenient in their requirements and even use residues from other wood-using industries.

Veneer logs

Most veneer logs from Ohio are used to make face veneer for furniture; some are used to make veneer for wooden baskets and boxes. In 1978, 7.7 million board feet of these high-quality, high-value hardwood logs were harvested in Ohio—almost one-third more than in 1973. Fifty-six percent of the veneer logs were shipped to four other states and Canada for manufacture, with Indiana receiving over two-thirds of the exported logs.

The four container plants in Ohio used less than one-fifth of the 4.7 million board feet of veneer logs received in Ohio in 1978. Total veneer log receipts of Ohio have decreased by about 20 percent since 1973, while the amount harvested and retained in the state for manufacturer has increased by about 10 percent. Most of the imported veneer logs were from Indiana, Michigan, and Tennessee.

White oak was the most popular veneer species harvested, exported, and used in the state in 1978. White oak logs accounted for almost half of Ohio's total veneer log production and almost one-third of the total receipts. Over half of the white oak harvested in Ohio went to Indiana; about one-fifth remained in Ohio.

Cooperage logs

In the late 1800's and early 1900's, cooperage shops and veneer box and basket plants were common throughout Ohio. They made a variety of wooden containers, such as barrels, baskets, and boxes to hold dry or liquid materials. For the most part, the wooden containers have been replaced by packaging products made from cloth, paper, plastic, glass, and metal; and the volume of wood used by the wooden-container industries in Ohio has declined to about 1 million board feet per year.

There are two types of wooden barrels—tight cooperage and slack cooperage. Tight cooperage is used to hold liquids; slack cooperage holds dry materials. Most wooden barrels made in recent years are tight cooperage made from white oak staves to hold bourbon whisky. Very little cooperage is made for other uses.

Except for the World War II years, national wooden barrel production was about 2.3 million barrels per year from 1934 to 1969. In 1970, federal regulations were enacted allowing the liquor industry to re-use bourbon barrels to make light-whisky. For the next 6 years, wooden barrel production dropped each year from 2.3 million in 1969 to 1.1 million in 1975. During this period, a strong market for light whisky failed to materialize and bourbon warehouse inventories declined. Since 1975, barrel production has increased each year to meet normal whisky demand and to replenish bourbon inventories.

Activity in the Ohio cooperage industry has been a reflection of national demands. The number of stave mills dropped from 12 in 1964 to 7 in 1973. By 1978, only four mills were operating. Between 1966 and 1973, both cooperage mill production and receipts dropped by more than one-third. Between 1973 and 1978, receipts and production increased—receipts by 7 percent (from 8.2 to 8.8 million board feet) and production by 10 percent (from 6.4 to 7 million board feet). Eighty percent of the 1978 receipts were harvested in Ohio.

Miscellaneous products

There are several small wood-using industries in Ohio whose combined 1978 timber requirements from the state's timberlands were only 3.2 million ft^3—4 percent of total harvest.

Although white ash is a minor species in Ohio's most important timber regions, it is the mainstay of one of the state's most stable wood-using industries—handle manufacturing. Ash is used for pulling and lifting tools such as shovels and rakes. Hickory—preferred for striking tools such as hammers and picks—also is harvested for handle stock.

Just over 3 million board feet of ash, hickory, and hard maple logs were harvested in Ohio in 1978 for use as handle stock. Ninety-four percent of the handle stock was ash, more than 5 percent was hickory, and less than 1 percent was hard maple. Handle log receipts in Ohio were 75 percent higher in 1978 than in 1973, while production was one-third less than in 1973 and 15 percent more than in 1962:

Year	*Number of plants*	*Production (million board feet)*[a]	*Receipts*
1962	5	2.7	3.1
1966	5	5.0	5.2
1973	3	4.6	4.0
1978	3	3.1	7.0

[a]International 1/4-inch rule.

Historically, most of the logs used by the Ohio handle industry have come from within the state. In 1978, almost 60 percent of the

handle stock was imported. Ash from Kentucky and Pennsylvania accounted for more than three-fourths of the imports; ash from New York accounted for nearly 20 percent.

Underground coal mining, which is concentrated in east-central Ohio, has relied on local timber for mine props and shoring material. One million ft^3 of local timber used as round and split mine timbers in underground coal mines in 1978, 29 percent less than was required in 1973 when more coal was being produced.

Ohio's charcoal industry has diminished considerably over the years due to stringent air pollution regulations and price increases for roundwood. The state's lone charcoal manufacturer relies solely on wood residues from other wood-manufacturing plants. Since 1961, no roundwood has been used to make charcoal and the use of manufacturing residues has declined:

Year	*Roundwood consumed*	*Residues consumed*
	-------thousand cords-------	
1956	0.2	13.2
1961	0.7	13.8
1966	0	12.0
1973	0	11.3
1978	0	D

D Data withheld to avoid disclosure.

Electrometallurgical wood is used along with coke and coal as a reductant in the smelting of metal-bearing ores. It is used primarily to provide bulk to the mix and to maintain a porous charge to facilitate venting of gases formed during smelting and provide carbon for the chemical reaction.

The two sources of metallurgical wood are chips from roundwood and manufacturing residues. The roundwood chips are moister and work deeper into the furnace before dissipating. The drier residue chips, which weigh less, are cheaper to transport.

The use of electrometallurgical wood in Ohio has decreased considerably since 1973 as more wood is used as domestic and commercial fuel. In 1978, only two ferro-alloy plants reported using wood in the electrometallurgical process compared with seven in 1973. The use of metallurgical chips from roundwood decreased by 46 percent to 46,000 tons and the use of residues declined by 24 percent to 68,000 tons. Almost all of these chips—98 percent of the roundwood and all but 288 tons of the residues—were from hardwoods.

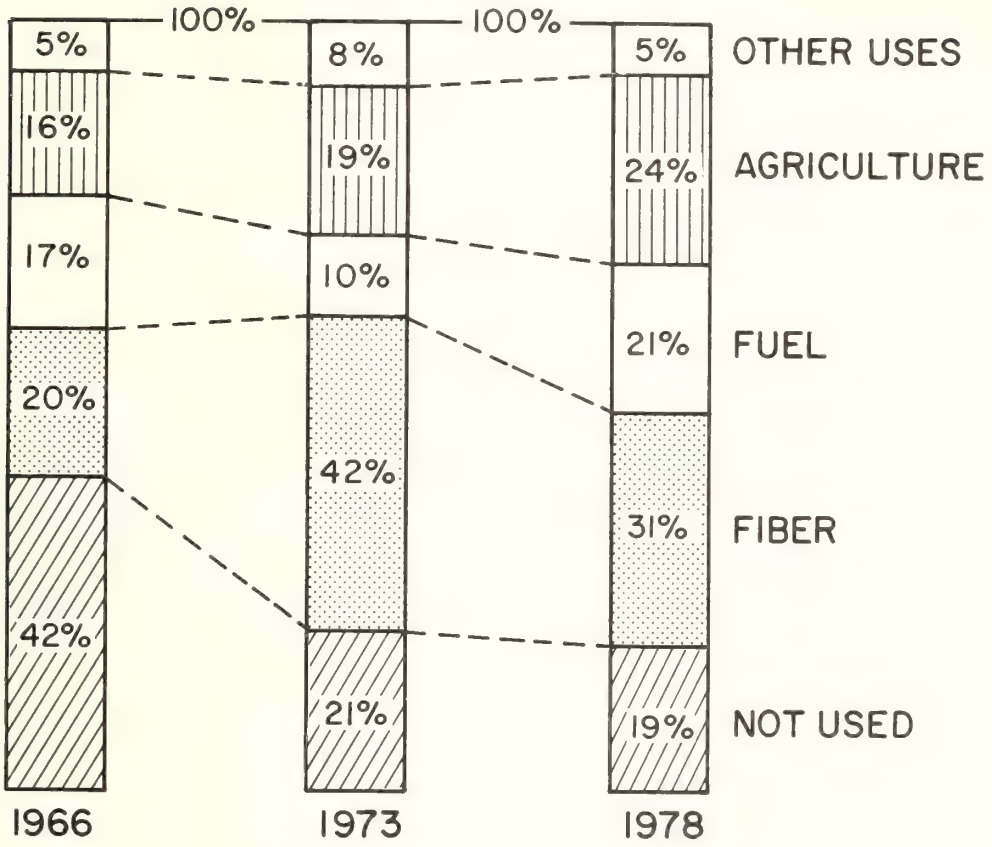
MANUFACTURING RESIDUES

Nearly 34 million ft^3 of residues were generated by Ohio's primary wood manufacturers in 1978. Woody material accounted for nearly 27.5 million ft^3 of the residue; bark made up about 6.6 million ft^3. Nearly half of the wood residue was suitable for conversion into wood chips for fiber products. Eighty-one percent of all residue—27 million ft^3—was used. Eighty-four percent of the wood residue and 69 percent of the bark residue were recovered and used.

In 1978, as in 1973, there was heavy demand for coarse residues such as sawmill slabs and edgings. Ninety-two percent of the total available was used for products such as woodpulp, charcoal, and metallurgical wood.

A comparison of the results of the 1978 survey with those of 1966 and 1973 show that more of the manufacturing residues are being used in recent years (Fig. 7):

Figure 7.—Trends in manufacturing residue use in Ohio in 1966, 1973, and 1978. (See table 20 for definition of terms.)



- Much less of the manufacturing residue is being left unused (2 percent less in 1978 than in 1973 and 23 percent less in 1978 than in 1966).
- Much more of the manufacturing residue is being used as fuelwood (11 percent more in 1978 than in 1973 and 4 percent more than in 1966).
- Much more of the manufacturing residue is being used for agricultural purposes (5 percent more in 1978 than in 1973 and 8 percent more than in 1966).
- The proportion of the manufacturing residue for other uses changed little between 1966 and 1978.
- After increasing by 22 percent from 1966 to 1973, the proportion of the manufacturing residue used as pulpwood may be stabilizing (11 percent less than used in 1978 than in 1973).
- Between 1973 and 1978, much more of the total manufacturing residue volume was being used for fuel and agricultural use and less was being left unused or used for other purposes, such as charcoal and electrometallurgical wood.

LITERATURE CITED

Steer, Henry B.
1948. **Lumber production in the United States, 1799-1946.** U.S. Dep. Agric. Misc. Publ. 699.

DEFINITION OF TERMS

Species

Softwoods. Coniferous trees, usually evergreen with needles or scalelike leaves.

Hardwoods. Dicotyledonous trees, usually broad-leaved and deciduous.

Harvest

Timber products output. Includes roundwood (round timer products harvested from growing stock on commercial forest land; from other sources, such as cull trees, salvable dead trees, limbs and tops, and saplings; from trees to noncommercial and nonforest lands; and from manufacturing plant byproducts.

Industrial timber harvest. Total production of round timber for conversion into wood products.

Logging residues. The unused portions of trees harvested or killed in the process of logging.

Manufacture

Primary wood-manufacturing plant. A plant that converts round timber to wood products such as woodpulp, lumber, veneer, cooperage, and dimension.

Roundwood products. Logs, bolts, and other round timber generated from harvesting trees for industrial or consumer uses.

Sawlog. A roundwood product from which products such as lumber are sawed, and which meets certain minimum standards of diameter, length, and defect, including a minimum 8-foot length and combination of size and defect specified in regional standards.

Pulpwood. Roundwood or plant byproducts cut (into 4- or 5-foot lengths or chipped) and prepared for manufacture into woodpulp.

Residues

Manufacturing plant residues. Wood materials that are generated when round timber (roundwood) is converted into wood products; includes slabs, edgings, trimmings, miscuts, sawdust, shavings, veneer cores and clippings, and pulp screenings.

Plant byproducts. Wood products, such as pulp chips, recycled from manufacturing plant residues.

Unused manufacturing residues. Plant residues that are dumped or destroyed and not recovered from plant byproducts.

Coarse residues. Manufacturing residues suitable for chipping, such as slabs, edgings, and veneer cores.

Fine residues. Manufacturing residues not suitable for chipping, such as sawdust and shavings.

INDEX TO TABLES

Industrial Timber Products

1. Volume of industrial roundwood, by-product harvested, Ohio, 1978.
2. Change in timber products output, Ohio, between 1973 and 1978.
3. Industrial timber harvest, by geographic unit, softwoods and hardwoods, and products, Ohio, 1978.

Sawlog Industry Statistics

4. Number of sawmills, by geographic unit and annual production class, Ohio, 1966, 1973, and 1978.
5. Sawlog production and receipts relationships, by geographic unit, Ohio, between 1973 and 1978.
6. Sawlog production, by softwoods and hardwoods, geographic unit, and destination of shipments, Ohio, 1978.
7. Sawlog receipts, by softwoods and hardwoods, geographic unit, and destination of shipments, Ohio, 1978.
8. Sawlog production and receipts in the South-Central geographic unit, by species and destination of shipment, Ohio, 1978.
9. Sawlog production and receipts in the Southeastern geographic unit, by species and destination of shipment, Ohio, 1978.
10. Sawlog production and receipts in the East-Central geographic unit, by species and destination of shipment, Ohio, 1978.
11. Sawlog production and receipts in the Northeastern geographic unit, by species and destination of shipment, Ohio, 1978.
12. Sawlog production and receipts in the Western geographic unit, by species and destination of shipment, Ohio, 1978.
13. Sawlog production and receipts, by species and destination of shipment, Ohio, 1978.

Other Timber Industry Statistics

14. Pulpwood production, by softwoods and hardwoods, Ohio, 1954-78.
15. Pulpwood harvest, by softwoods and hardwoods and geographic unit, Ohio, 1964-78.
16. Veneer log production in Ohio, by species and consuming state, 1978.
17. Veneer log receipts in Ohio, by species and producing state, 1978.
18. Veneer log production and receipts in Ohio, for selected years, 1956-78.
19. White oak cooperage log and bolt production and receipts and number of operating plants in Ohio, for selected years, 1958-78.
20. Source industry and disposition of manufacturing residues, by type of use and type of residue, Ohio, 1978.
21. Volume of unused sawmill residues, by geographic unit, softwoods and hardwoods, and type of residue, Ohio, 1978.

Table 1.—Volume of industrial roundwood, by product harvested, Ohio, 1978.

Product	Standard unit	Volume in standard units			Roundwood volume		
		All species	Softwood	Hardwood	All species	Softwood	Hardwood
					Thousand cubic feet		
Sawlogs	M board feet[a]	321,813	5,696	316,117	47,275	877	46,398
Pulpwood	Standard cords[b]	251,846	4,422	247,424	21,403	374	21,029
Veneer logs	M board feet[a]	7,716	—	7,716	1,133	—	1,133
Cooperage logs	M board feet[a]	7,037	—	7,037	1,033	—	1,033
Mine timbers	M cubic feet	1,010	83	927	1,010	83	927
Misc. products[c]	M cubic feet	2,192	880	1,312	2,192	880	1,312
Total	—	—	—	—	74,046	2,214	71,832

[a]International 1/4-inch rule.
[b]Rough wood basis equivalent to 85 ft^3 of solid wood.
[c]Includes guardrails, handle stock, metallurgical wood, poles, posts, and piling.

Table 2.—Change in timber products output, Ohio, between 1973 and 1978.

Product	All species			Softwoods			Hardwoods		
	1973	1978	Change	1973	1978	Change	1973	1978	Change
	Million cubic feet		*Percent*	*Million cubic feet*		*Percent*	*Million cubic feet*		*Percent*
Sawlogs	54.0	47.3	-12	0.1	0.9	(b)	53.9	46.4	-14
Pulpwood	18.9	21.4	+13	.4	.4	—	18.5	21.0	+14
Veneer logs	.8	1.1	+38	—	—	—	.8	1.1	+38
Cooperage logs	.9	1.0	+11	—	—	—	.9	1.0	+11
Mine timbers	1.4	1.0	-29	.1	(c)	—	1.3	1.0	-23
Misc. products[a]	4.5	2.2	-51	.3	.9	(b)	4.2	1.3	-69
Total	80.5	74.0	-8	.9	2.2	(b)	79.6	71.8	-10

[a]Includes guardrails, handle stock, metallurgical wood, poles, posts, and piling.
[b]Greater than 100 percent.
[c]Less than 100,000 ft^3.

Table 3.—Industrial timber harvest[a] by geographic unit, softwoods and hardwoods, and products, Ohio, 1978.

(In thousands of cubic feet)

Geographic unit and species group	Sawlogs	Pulpwood	Other products[b]	All products
South-Central				
Softwoods	396	85	451	932
Hardwoods	10,703	8,712	633	20,048
Total	11,099	8,797	1,084	20,980
Southeastern				
Softwoods	412	51	449	912
Hardwoods	8,292	6,698	962	15,952
Total	8,704	6,749	1,411	16,864
East-Central				
Softwoods	21	—	62	83
Hardwoods	11,240	4,123	1,389	16,752
Total	11,261	4,123	1,451	16,835
Northeastern				
Softwoods	40	238	1	279
Hardwoods	6,393	230	365	6,988
Total	6,433	468	366	7,267
Western				
Softwoods	8	—	—	8
Hardwoods	9,770	1,266	1,056	12,092
Total	9,778	1,226	1,056	12,100
All units				
Softwoods	877	374	953	2,214
Hardwoods	46,398	21,029	4,405	71,832
Total	47,275	21,403	5,368	74,046

[a]Does not include fuelwood or removals that were not manufactured into industrial products.

[b]Includes cooperage and veneer logs, handle stock, metallurgical wood, mine timbers, posts and piling.

Table 4.—Number of sawmills, by geographic unit and annual production class, Ohio, 1966, 1973, and 1978.

Geographic unit	Production class[a]									Total		
	More than 1 million board feet			Less than 1 million board feet			Idle and custom mills					
	1966	1973	1978	1966	1973	1978	1966	1973	1978	1966	1973	1978
South-Central	9	18	26	31	18	55	19	21	13	59	57	94
Southeastern	7	18	21	16	8	8	21	9	7	44	35	36
East-Central	10	18	17	24	27	16	33	17	27	67	62	60
Northeastern	5	17	27	33	32	9	57	21	21	95	70	57
Western	8	15	29	42	37	20	96	34	30	146	86	79
All units	39	86	120	146	122	108	226	102	98	411	310	326

[a]Based on sawlog receipts or reported annual lumber production capacity.

Table 5.—Sawlog production and receipts relationships, by geographic unit, Ohio, between 1973 and 1978.

Geographic unit	Production			Receipts		
	1973	1978	Change	1973	1978	Change
	Million board feet[a]	*Million board feet*	*Percent*	*Million board feet*	*Million board feet*	*Percent*
South-Central	82.0	85.2	+ 4	69.7	91.9	+32
Southeastern	64.6	55.7	-14	77.1	73.0	- 5
East-Central	92.2	76.4	-17	92.6	81.0	-13
Northeastern	61.5	41.9	-32	68.2	48.2	-29
Western	50.5	62.6	+24	50.7	48.4	- 5
All units	350.8	321.8	- 8	358.3	342.5	- 4

[a]International 1/4-inch rule.

Table 6.—Sawlog production, by softwoods and hardwoods, geographic unit, and destination of shipments, Ohio, 1978.

(In millions of board feet)[a]

Species group and geographic unit	Retained in unit	Logs shipped to:		Total production
		Other units	Other states	
Softwoods				
South-Central	*	2.4	0.1	2.5
Southeastern	2.9	—	—	2.9
East-Central	.1	*	—	.1
Northeastern	.2	—	—	.2
Western	*	*	—	*
Total softwoods	3.2	2.4	0.1	5.7
Hardwoods				
South-Central	73.0	8.3	1.4	82.7
Southeastern	41.0	10.5	1.3	52.8
East-Central	65.8	10.5	—	76.3
Northeastern	35.0	6.1	.6	41.7
Western	42.2	15.5	4.9	62.6
Total hardwoods	257.0	50.9	8.2	316.1
All species	260.2	53.3	8.3	321.8

[a]International 1/4-inch rule.
*Less than 50,000 board feet.

Table 7.—Sawlog receipts, by softwoods and hardwoods, geographic unit, and destination of shipments, Ohio, 1978.

(In millions of board feet)[a]

Species group and geographic unit	Where produced			Total receipts
	In unit	In state	In other states	
Softwoods				
South-Central	*	—	—	*
Southeastern	2.9	2.4	0.3	5.6
East-Central	.1	—	—	.1
Northeastern	.2	*	—	.2
Western	*	—	—	*
Total softwoods	3.2	2.4	0.3	5.9
Hardwoods				
South-Central	73.0	9.3	9.6	91.9
Southeastern	41.0	14.6	11.8	67.4
East-Central	65.8	12.6	2.5	80.9
Northeastern	35.0	12.1	.9	48.0
Western	42.2	2.3	3.9	48.4
Total hardwoods	257.0	50.9	28.7	336.6
All species	260.2	53.3	29.0	342.5

[a]International 1/4-inch rule.
*Less than 50,000 board feet.

Table 8.—Sawlog production and receipts in the South-Central geographic unit, by species and destination of shipment, Ohio, 1978.

(In millions of board feet)[a]

Species	Cut and retained in unit	Out-shipments		Total production	In-shipments		Total receipts
		To other units	To other states		From other units	From other states	
White and red pine	*	0.7	*	0.7	—	—	*
Yellow pine	—	1.7	0.1	1.8	—	—	—
Total softwoods	*	2.4	0.1	2.5	—	—	*
Ash	1.7	0.2	*	1.9	0.2	*	1.9
Aspen[b]	.3	*	—	.3	.1	—	.4
Basswood	.3	.2	*	.5	.1	*	.4
Beech	1.7	.2	*	1.9	.1	*	1.8
Black cherry	.7	.1	—	.8	.1	*	.8
Elm	*	*	*	—	—	—	*
Hickory	2.6	.4	*	3.0	.3	*	2.9
Black locust	.3	*	—	.3	—	—	.3
Hard maple	1.5	.3	.2	2.0	.2	*	1.7
Soft maple	1.1	.2	—	1.3	.3	*	1.4
White oak[c]	21.2	2.2	.3	23.7	3.2	3.0	27.4
Red oak[d]	20.8	2.5	.1	23.4	1.2	2.8	24.8
Other oaks	1.4	.1	—	1.5	.2	*	1.6
Sycamore	.4	.3	—	.7	.2	*	.6
Black walnut	.5	.2	.4	1.1	.2	*	.7
Yellow-poplar	9.6	.8	*	10.4	2.6	2.8	15.0
Other hardwoods	8.9	.6	.4	9.9	.3	1.0	10.2
Total hardwoods	73.0	8.3	1.4	82.7	9.3	9.6	91.9
All species	73.0	10.7	1.5	85.2	9.3	9.6	91.9

[a]International 1/4-inch rule.
[b]Includes cottonwood.
[c]Includes chestnut oak.
[d]Includes black oak.
*Less than 50 M bf.

Table 9.—Sawlog production and receipts in the Southeastern geographic unit, by species and destination of shipment, Ohio, 1978.

(In millions of board feet)[a]

Species	Cut and retained in unit	Out-shipments		Total production	In-shipments		Total receipts
		To other units	To other states		From other units	From other states	
White and red pine	0.9	—	—	0.9	0.8	0.1	1.8
Yellow pine	2.0	—	—	2.0	1.6	.2	3.8
Total softwoods	2.9	—	—	2.9	2.4	0.3	5.6
Ash	1.4	0.2	1.2	2.8	0.7	0.6	2.7
Aspen[b]	.1	.3	—	.4	.1	—	.2
Basswood	.2	.1	—	.3	.1	.2	.5
Beech	1.3	.3	—	1.6	.6	.3	2.2
Black cherry	.6	.2	—	.8	.1	.2	.9
Elm	.1	*	—	.1	.1	.1	.3
Hickory	1.1	.2	—	1.3	.8	.3	2.2
Black locust	.3	*	—	.3	—	—	.3
Hard maple	1.4	.3	—	1.7	.8	.4	2.6
Soft maple	.7	.2	—	.9	.5	.1	1.3
White oak[c]	11.3	3.3	—	14.6	3.5	3.5	18.3
Red oak[d]	12.6	2.0	—	18.1	4.5	3.5	20.6
Other oaks	.3	.1	—	.4	.1	.4	.8
Sycamore	.7	.1	—	.8	.2	.2	1.1
Black walnut	.5	.2	*	.7	.1	.2	.8
Yellow-poplar	4.8	2.7	.1	7.6	1.4	1.5	7.7
Other hardwoods	3.6	.3	—	3.9	1.0	.3	4.9
Total hardwoods	41.0	10.5	1.3	52.8	14.6	11.8	67.4
All species	43.9	10.5	1.3	55.7	17.0	12.1	73.0

[a]International 1/4-inch rule.
[b]Includes cottonwood.
[c]Includes chestnut oak.
[d]Includes black oak.
*Less than 50 M bf.

Table 10.—Sawlog production and receipts in the East-Central geographic unit, by species and destination of shipment, Ohio, 1978.

(In millions of board feet)[a]

Species	Cut and retained in unit	Out-shipments		Total production	In-shipments		Total receipts
		To other units	To other states		From other units	From other states	
White and red pine	0.1	*	—	0.1	—	—	0.1
Other softwoods	*	—	—	*	—	—	*
Total softwoods	0.1	*	—	0.1	—	—	0.1
Ash	2.5	0.7	—	3.2	0.3	*	2.8
Aspen[b]	.5	*	—	.5	.2	—	.7
Basswood	.2	*	—	.2	.1	—	.3
Beech	2.3	.6	—	2.9	.6	*	2.9
Black cherry	3.0	.1	—	3.1	.5	0.5	4.0
Elm	.8	.1	—	.9	.1	*	.9
Hickory	1.1	.4	—	1.5	.2	*	1.3
Black locust	*	*	—	*	*	—	*
Hard maple	3.4	.5	—	3.9	.6	.1	4.1
Soft maple	3.0	.4	—	3.4	.7	.1	3.8
White oak[c]	12.5	2.2	—	14.7	1.9	.5	14.9
Red oak[d]	22.8	4.0	—	26.8	4.2	.9	27.9
Other oaks	.6	.2	—	.8	.1	—	.7
Sycamore	.8	.1	—	.9	.4	*	1.2
Black walnut	.7	*	—	.7	.1	*	.8
Yellow-poplar	5.6	.9	—	6.5	1.0	.2	6.8
Other hardwoods	6.0	.3	—	6.3	1.6	.2	7.8
Total hardwoods	65.8	10.5	—	76.3	12.6	2.5	80.9
All species	65.9	10.5	—	76.4	12.6	2.5	81.0

[a]International 1/4-inch rule.
[b]Includes cottonwood.
[c]Includes chestnut oak.
[d]Includes black oak.
*Less than 50 M bf.

Table 11.—Sawlog production and receipts in the Northeastern geographic unit, by species and destination of shipment, Ohio, 1978.

(In millions of board feet)[a]

Species	Cut and retained in unit	Out-shipments		Total production	In-shipments		Total receipts
		To other units	To other states		From other units	From other states	
Hemlock	*	—	—	*	—	—	*
White and red pine	0.2	—	—	0.2	*	—	0.2
Total softwoods	0.2	—	—	0.2	*	—	0.2
Ash	2.8	0.1	0.6	3.5	1.0	0.1	3.9
Aspen[b]	.2	*	—	.2	*	—	.2
Basswood	.5	—	—	.5	.2	—	.7
Beech	3.3	.2	—	3.5	1.3	—	4.6
Black cherry	1.0	.2	—	1.2	.2	.1	1.3
Elm	.1	.1	—	.2	*	—	.1
Hickory	.8	.2	*	1.0	.2	—	1.0
Black locust	*	—	—	*	*	—	*
Hard maple	3.0	.1	*	3.1	.8	.1	3.9
Soft maple	2.6	.2	*	2.8	.5	.1	3.2
White oak[c]	4.1	1.0	*	5.1	2.3	—	6.4
Red oak[d]	9.8	2.1	*	11.9	3.9	.2	13.9
Other oaks	.3	*	—	.3	.2	—	.5
Sycamore	.7	.1	—	.8	.1	—	.8
Black walnut	.1	*	—	.1	.1	—	.2
Yellow-poplar	2.4	.3	—	2.7	.4	.1	2.9
Other hardwoods	3.3	1.5	—	4.8	.9	.2	4.4
Total hardwoods	35.0	6.1	0.6	41.7	12.1	0.9	48.0
All species	35.2	6.1	0.6	41.9	12.1	0.9	48.2

[a]International 1/4-inch rule.
[b]Includes cottonwood.
[c]Includes chestnut oak.
[d]Includes black oak.
*Less than 50 M bf.

Table 12.—Sawlog production and receipts in the Western geographic unit, by species and destination of shipment, Ohio, 1978.

(In millions of board feet)[a]

Species	Cut and retained in unit	Out-shipments		Total production	In-shipments		Total receipts
		To other units	To other states		From other units	From other states	
Hemlock	*	—	—	*	—	—	*
White and red pine	—	*	—	*	—	—	*
Total softwoods	*	*	—	*	—	—	*
Ash	3.2	1.2	0.5	4.9	0.2	0.2	3.6
Aspen[b]	2.3	.2	*	2.5	.1	.2	2.6
Basswood	.6	.2	*	.8	*	*	.6
Beech	1.7	1.5	*	3.2	.2	.1	2.0
Black cherry	.5	.4	*	.9	.1	*	.6
Elm	.2	*	*	.2	—	*	.2
Hickory	1.7	.5	*	2.2	.2	.1	2.0
Black locust	*	—	—	*	—	—	*
Hard maple	2.6	1.3	.3	4.2	.1	.1	2.8
Soft maple	2.6	1.1	.5	4.2	.1	*	2.7
White oak[c]	11.5	2.6	1.8	15.9	.4	.4	12.3
Red oak[d]	9.6	3.9	.6	14.1	.7	.4	10.7
Other oaks	2.2	.2	.5	2.9	*	.6	2.8
Sycamore	1.1	.4	*	1.5	.1	.1	1.3
Black walnut	1.1	.1	.6	1.8	*	1.5	2.6
Yellow-poplar	.7	.8	*	1.5	.1	.2	1.0
Other hardwoods	.6	1.1	.1	1.8	*	—	.6
Total hardwoods	42.2	15.5	4.9	62.6	2.3	3.9	48.4
All species	42.2	15.5	4.9	62.6	2.3	3.9	48.4

[a] International 1/4-inch rule.
[b] Includes cottonwood.
[c] Includes chestnut oak.
[d] Includes black oak.
*Less than 50 M bf.

Table 13.—Sawlog production and receipts, by species and destination of shipment, Ohio, 1978.

(In millions of board feet)[a]

Species	Cut and retained in state	Exported to:			Total production	Imported from:				Total receipts
		Indiana	Pennsylvania	West Virginia		Kentucky	Pennsylvania	West Virginia	Other states	
Hemlock	*	—	—	—	*	—	—	—	—	*
White and red pine	1.9	—	—	*	1.9	*	—	0.1	—	2.0
Yellow pine	3.7	—	—	0.1	3.8	0.1	—	.1	—	3.9
Other softwoods	*	—	—	—	*	*	—	—	—	*
Total softwoods	5.6	—	—	0.1	5.7	0.1	—	0.2	—	5.9
Ash	14.0	0.5	0.6	1.2	16.3	*	0.1	0.6	0.2	14.9
Aspen[b]	3.9	*	—	—	3.9	*	—	—	.2	4.1
Basswood	2.3	*	—	*	2.3	*	—	.2	*	2.5
Beech	13.1	*	—	*	13.1	*	—	.3	.1	13.5
Black cherry	6.8	*	—	—	6.8	*	.4	.4	*	7.6
Elm	1.4	*	—	*	1.4	—	—	.1	*	1.5
Hickory	9.0	*	*	*	9.0	*	—	.3	.1	9.4
Black locust	.6	—	—	—	.6	—	—	—	—	.6
Hard maple	14.4	.3	*	.2	14.9	*	.2	.5	*	15.1
Soft maple	12.1	.5	*	—	12.6	*	.1	.2	*	12.4
White oak[c]	71.9	1.8	*	.3	74.0	2.6	.3	4.1	.4	79.3
Red oak[d]	90.1	.6	*	.1	90.8	2.6	.8	4.1	.3	97.9
Other oaks	5.4	.6	*	.1	5.9	*	—	.4	.6	6.4
Sycamore	4.7	*	—	—	4.7	.1	—	.2	*	5.0
Black walnut[e]	3.4	.6	—	.4	4.4	.6	—	.3	.8	5.1
Yellow-poplar	28.6	*	—	.1	28.7	2.8	.2	1.7	.1	33.4
Other hardwoods	26.2	*	—	.5	26.7	.9	.3	.5	—	27.9
Total hardwoods	307.9	4.8	0.6	2.8	316.1	9.6	2.4	13.9	2.8	336.6
All species	313.5	4.8	0.6	2.9	321.8	9.7	2.4	14.1	2.8	342.5

[a]International 1/4-inch rule.
[b]Includes cottonwood.
[c]Includes chestnut oak.
[d]Includes black oak.
[e]Less than 50 M bf to Kentucky.
*Less than 50 M bf.

Table 14.—Pulpwood production, by softwoods and hardwoods, Ohio, 1954-78[a]

(In thousands of rough cords)

Year	All species	Softwoods	Hardwoods
1954	67.6	—	67.6
1955	79.8	—	79.8
1956	95.3	1.1	94.2
1957	116.8	.8	116.0
1958	140.5	.8	139.7
5-year total	500.00	2.7	497.3
1959	165.3	.8	164.5
1960	214.4	1.5	212.9
1961	246.3	.8	245.5
1962	269.0	.7	268.3
1963	299.6	1.8	297.8
5-year total	1,194.6	5.6	1,189.0
1964	332.3	8.7	323.6
1965	313.1	12.2	300.9
1966	375.5	10.4	365.1
1967	336.0	15.1	320.9
1968	266.1	5.7	260.4
5-year total	1,623.0	52.1	1,570.9
1969	299.4	12.2	287.2
1970	343.8	13.4	330.4
1971	360.1	11.3	348.8
1972	327.9	8.6	319.3
1973	369.4	9.1	360.3
5-year total	1,700.6	54.6	1,646.0
1974	376.8	7.3	369.5
1975	279.1	7.3	271.8
1976	383.0	6.3	376.7
1977	462.3	7.1	455.2
1978	371.6	4.7	366.9
5-year total	1,872.8	32.7	1,840.1

[a]Includes production from roundwood and manufacturing residues.

Table 15.—Pulpwood harvest, by softwoods and hardwoods and geographic unit, Ohio, 1964-78.

(In thousands of rough cords)

Species group and geographic unit	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	All years
Softwoods																
South-Central	4.8	6.8	7.3	9.7	4.3	8.9	8.9	6.6	4.8	4.2	1.9	1.7	1.5	1.2	1.0	73.6
Southeastern	3.8	5.2	2.7	4.2	0.9	2.4	4.3	3.1	0.9	0.4	.9	.7	2.3	1.4	.6	33.8
East-Central	—	—	—	—	0.1	*	*	—	*	0.2	—	—	—	—	—	.4
Northeastern	0.1	0.1	0.1	0.2	0.1	0.6	0.2	—	0.7	—	1.3	1.9	2.5	2.4	2.8	13.0
Western	—	—	0.3	1.0	0.3	0.3	—	—	—	—	—	—	—	—	—	1.9
All units	8.7	12.1	10.4	15.1	5.7	12.2	13.4	9.7	6.4	4.8	4.1	4.3	6.3	5.0	4.4	122.6
Hardwoods																
South-Central	103.1	133.5	142.6	142.2	125.4	136.1	128.4	115.7	115.1	109.6	113.5	71.5	122.3	119.5	102.5	1,781.0
Southeastern	49.9	48.6	62.6	55.2	49.4	27.9	55.2	59.2	56.3	43.6	50.0	44.8	65.1	82.5	78.8	829.1
East-Central	56.3	45.4	82.1	31.4	29.4	33.3	26.7	56.1	26.3	39.4	69.9	51.2	60.1	56.4	48.5	712.5
Northeastern	14.1	7.3	6.0	6.1	5.4	6.6	8.0	10.7	9.5	5.0	8.0	1.9	2.4	2.6	3.1	96.7
Western	23.5	25.5	33.0	31.1	17.3	14.8	20.1	24.6	20.2	20.4	15.7	12.0	14.1	20.5	14.5	307.3
All units	246.9	260.3	326.3	266.0	226.9	218.7	238.4	266.3	227.4	218.0	257.1	181.4	264.0	281.7	247.4	3,726.8
All species	255.6	272.4	336.7	281.1	232.6	230.9	251.8	276.0	233.8	222.8	261.2	185.7	270.3	286.7	251.8	3,849.4

*Less than 50 cords.

Table 16.—Veneer log production[a] in Ohio, by species and consuming state, 1978.

(In thousands of board feet)[b]

Species	Cut and retained in state	Exported to:					Total production
		Indiana	Kentucky	Missouri	Ontario	West Virginia	
Ash	26	33	—	2	2	—	63
Aspen	83	—	—	—	—	—	83
Basswood	19	—	—	—	—	—	19
Beech	807	—	—	—	—	—	807
Black cherry	—	27	—	—	—	—	27
Elm	38	—	—	—	17	—	55
Hickory	68	31	—	—	—	—	99
Hard maple	109	9	—	—	6	—	124
Soft maple	175	—	—	—	—	—	175
White oak	808	2,018	—	148	114	570	3,658
Red oak	—	525	57	—	342	—	924
Pecan	425	—	—	—	—	—	425
Sycamore	265	—	—	—	—	—	265
Black walnut	472	429	7	3	1	—	912
Yellow-poplar	52	—	—	—	—	—	52
Other species[c]	28	—	—	—	—	—	28
All species	3,375	3,072	64	153	482	570	7,716

[a] Veneer logs that were handled by brokers for overseas shipment are not included.
[b] International 1/4-inch rule.
[c] Includes miscellaneous hardwoods such as yellow birch.

Table 17.—Veneer log receipts in Ohio, by species and producing state, 1978.

(In thousands of board feet)[a]

Species	Cut and retained in state	Imported from:						Total receipts
		Indiana	Michigan	Mississippi	Tennessee	Wisconsin	Other states[b]	
Hard maple	109	19	116	—	—	—	53	297
White oak	808	68	83	94	362	—	49	1,464
Pecan	425	—	—	—	—	—	—	425
Walnut	472	84	—	—	63	94	150	949
Other species[c]	1,561	—	86	—	—	—	—	1,561
All species	3,375	171	285	94	425	94	252	4,696

[a] International 1/4-inch rule.
[b] Includes Alabama, Arkansas, Illinois, Iowa, Louisiana, Missouri, New York, West Virginia, and Ontario, Canada.
[c] Includes ash, aspen, basswood, beech, black cherry, elm, hickory, red oak, black walnut, yellow-poplar, and miscellaneous hardwoods such as yellow birch.

Table 18.—Veneer log production[a] and receipts in Ohio, for selected years, 1956-78.

(In thousands of board feet)[b]

Year	Production	Receipts
1956	8,731	5,658
1958	8,035	6,086
1960	11,135	6,739
1963	8,449	5,000
1966	6,712	5,648
1968	7,886	4,781
1972	7,200	6,914
1973	5,866	5,874
1976	7,575	3,685
1978	7,716	4,696

[a]Veneer logs handled by brokers for overseas shipment are not included.
[b]International 1/4-inch rule.

Table 19.—White oak cooperage log and bolt production and receipts and number of operating plants in Ohio, for selected years, 1958-78.

(In thousands of board feet)[a]

Year	Number of plants	Production	Receipts
1958	4	8,579	8,600
1960	11	13,598	14,735
1962	10	12,427	12,654
1964	12	16,000	17,303
1966	7	11,000	12,838
1973	7	6,372	8,210
1978	4	7,037	8,780

[a]International 1/4-inch rule.

Table 20.—Source industry and disposition of manufacturing residues, by type of use and type of residue, Ohio, 1978.

(In thousands of cubic feet)

Disposition	Type of residue			All types
	Bark	Coarse[a]	Fine[b]	
		LUMBER		
Fiber[c]	191	9,738	38	9,967
Fuel[d]	1,353	3,735	1,297	6,385
Agriculture[e]	2,703	—	5,288	7,991
Other[f]	178	997	40	1,215
Total, used	4,425	14,470	6,663	25,558
Unused	1,933	926	2,940	5,799
		VENEER		
Fiber	—	—	—	—
Fuel	49	276	55	380
Agriculture	36	—	61	97
Other	—	—	—	—
Total, used	85	276	116	477
Unused	—	—	—	—
		COOPERAGE		
Fiber	—	481	—	481
Fuel	64	—	51	115
Agriculture	—	—	6	6
Other	—	321	—	321
Total, used	64	802	57	923
Unused	95	—	83	178
		OTHER INDUSTRIES[g]		
Fiber	—	77	13	90
Fuel	41	206	9	256
Agriculture	15	—	27	42
Other	—	—	—	—
Total, used	56	283	49	388
Unused	74	375	66	515
		ALL INDUSTRIES		
Fiber	191	10,296	51	10,538
Fuel	1,507	4,217	1,412	7,136
Agriculture	2,754	—	5,382	8,136
Other	178	1,318	40	1,536
Total, used	4,630	15,831	6,885	27,346
Unused	2,102	1,301	3,089	6,492

[a] Includes slabs, edgings, trimmings, veneer cores, and other material suitable for chipping.
[b] Includes sawdust, shavings, and other material considered unsuitable for chipping.
[c] Includes woodpulp and composite products.
[d] Includes both domestic and industrial fuel.
[e] Includes livestock bedding and farm and horticultural mulch.
[f] Includes small dimension, charcoal wood, chemical wood, and metallurgical chips.
[g] Includes handles, guardrails, and mine timbers; excludes the woodpulp industry.

Table 21.—Volume of unused sawmill residues, by geographic unit, softwoods and hardwoods, and type of residue, Ohio, 1978.

(In thousands of cubic feet)

Geographic unit	Softwoods			Hardwoods			All species		
	Bark	Coarse	Fine	Bark	Coarse	Fine	Bark	Coarse	Fine
South-Central	*	*	*	925	136	1,386	925	136	1,386
Southeastern	86	—	17	603	585	1,138	689	585	1,155
East-Central	—	—	—	139	5	174	139	5	174
Northeastern	5	4	2	99	104	88	104	108	90
Western	*	*	*	76	92	135	76	92	135
Total	91	4	19	1,842	922	2,921	1,933	926	2,940

*Less than 2,000 ft^3.

Round Timber Conversions for Major Products

Softwood logs: M bf (International 1/4-inch rule) = 154.0 ft^3 = 4.36 m^3

Hardwood logs: M bf (International 1/4-inch rule) = 146.8 ft^3 = 4.16 m^3

Pulpwood: 1 standard cord = 85 ft^3 = 2.41 m^3 = 0.369 green tons

☆U.S. GOVERNMENT PRINTING OFFICE: 1980-603-111/38

Nevel, Robert L., Jr. and Robert B. Redett.
1980. **Ohio timber industries—a periodic assessment of timber output.** Northeast. For. Exp. Stn., Broomall, Pa.
33 p., illus. (USDA For. Serv. Res. Bull. NE-64)

Reports the results of a survey of the timber industries of Ohio; contains statistics on industrial timber production and receipts, and production and disposition of the manufacturing residues. Comparisons are made with the most recent survey, and trends in industrial wood output are noted. Includes 21 statistical tables.

792:83(771)

Keywords: Timber output, wood residue use, Ohio manufacturers, production statistics

Nevel, Robert L., Jr. and Robert B. Redett.
1980. **Ohio timber industries—a periodic assessment of timber output.** Northeast. For. Exp. Stn., Broomall, Pa.
33 p., illus. (USDA For. Serv. Res. Bull. NE-64)

Reports the results of a survey of the timber industries of Ohio; contains statistics on industrial timber production and receipts, and production and disposition of the manufacturing residues. Comparisons are made with the most recent survey, and trends in industrial wood output are noted. Includes 21 statistical tables.

792:83(771)

Keywords: Timber output, wood residue use, Ohio manufacturers, production statistics

Nevel, Robert L., Jr. and Robert B. Redett.
1980. **Ohio timber industries—a periodic assessment of timber output.** Northeast. For. Exp. Stn., Broomall, Pa.
33 p., illus. (USDA For. Serv. Res. Bull. NE-64)

Reports the results of a survey of the timber industries of Ohio; contains statistics on industrial timber production and receipts, and production and disposition of the manufacturing residues. Comparisons are made with the most recent survey, and trends in industrial wood output are noted. Includes 21 statistical tables.

792:83(771)

Keywords: Timber output, wood residue use, Ohio manufacturers, production statistics

Nevel, Robert L., Jr. and Robert B. Redett.
1980. **Ohio timber industries—a periodic assessment of timber output.** Northeast. For. Exp. Stn., Broomall, Pa.
33 p., illus. (USDA For. Serv. Res. Bull. NE-64)

Reports the results of a survey of the timber industries of Ohio; contains statistics on industrial timber production and receipts, and production and disposition of the manufacturing residues. Comparisons are made with the most recent survey, and trends in industrial wood output are noted. Includes 21 statistical tables.

792:83(771)

Keywords: Timber output, wood residue use, Ohio manufacturers, production statistics

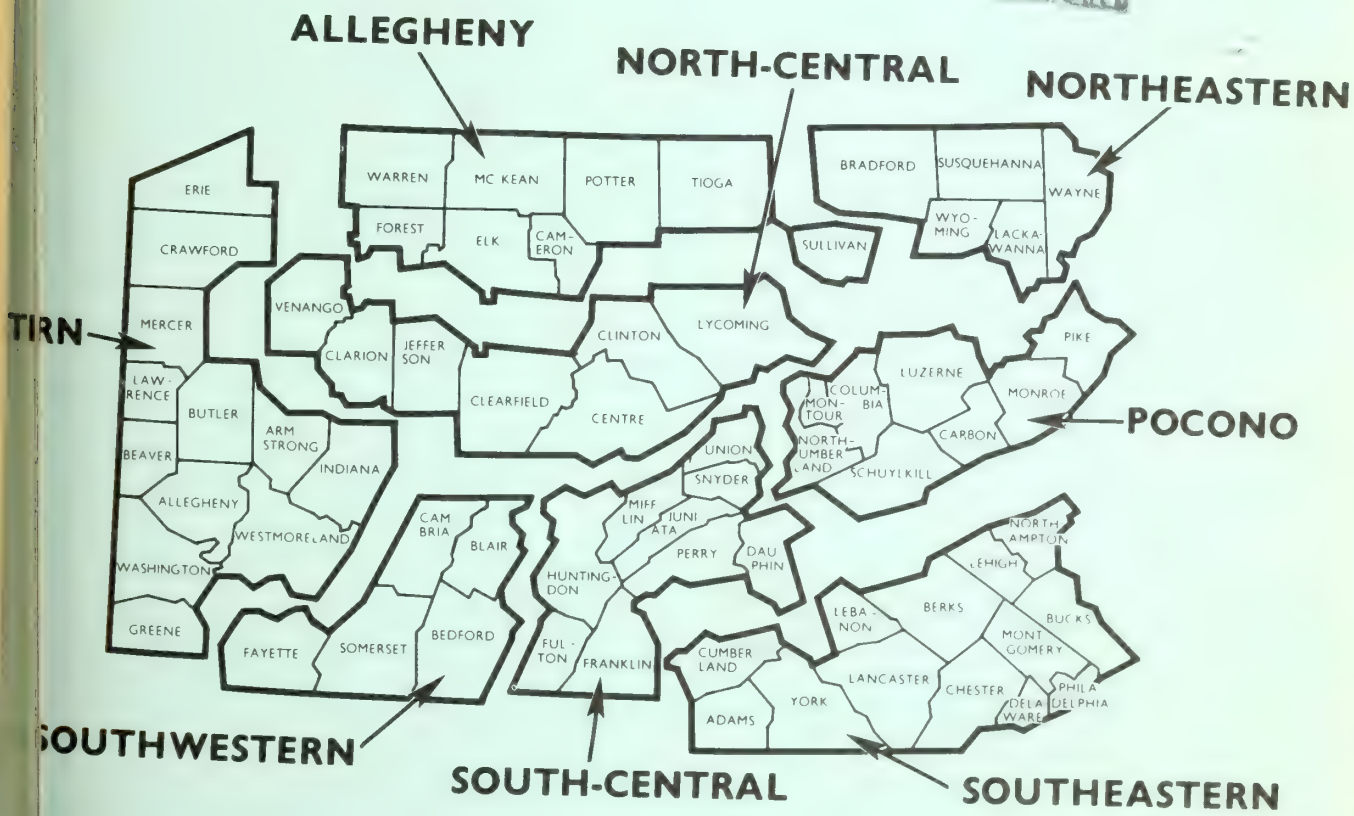
Headquarters of the Northeastern Forest Experiment Station are in Broomall, Pa. Field laboratories and research units are maintained at:

- **Amherst, Massachusetts, in cooperation with the University of Massachusetts.**
- **Beltsville, Maryland.**
- **Berea, Kentucky, in cooperation with Berea College.**
- **Burlington, Vermont, in cooperation with the University of Vermont.**
- **Delaware, Ohio.**
- **Durham, New Hampshire, in cooperation with the University of New Hampshire.**
- **Hamden, Connecticut, in cooperation with Yale University.**
- **Kingston, Pennsylvania.**
- **Morgantown, West Virginia, in cooperation with West Virginia University, Morgantown.**
- **Orono, Maine, in cooperation with the University of Maine, Orono.**
- **Parsons, West Virginia.**
- **Princeton, West Virginia.**
- **Syracuse, New York, in cooperation with the State University of New York College of Environmental Sciences and Forestry at Syracuse University, Syracuse.**
- University Park, Pennsylvania, in cooperation with The Pennsylvania State University.
- **Warren, Pennsylvania.**

Forest Statistics for Pennsylvania - 1978

USDA Forest Service
1980
Northeastern Forest Experiment Station
370 Reed Road
Broomall, PA 19008

CLEMSON UNIVERSITY LIBRARY
JAN 12 1981
SCI., TECH. & AGR. DEPT.
GOVT
JAN 8 1981
CLEMSON
LIBRARY



USDA Forest Service Resource Bulletin NE-65

FOREWORD

The third inventory of Pennsylvania was directed by Carl E. Mayer, Resources Evaluation unit leader. Joseph E. Barnard was responsible for the design of the inventory and sample selection. John R. Peters supervised the aerial-photo interpretation and data collection by field crews. He was assisted by Mark A. Cooper, III, Stanley L. Kobielski, James M. McGrath, James M. Miller, and Ronald L. Taylor. The other field workers were: David J. Alerich, Dennis M. Brehm, Timothy J. Breneisen, William S. Cook, Carla J. Derby, Eileen M. Doherty, Daniel J. Evans, Michael E. Glova, Stanley E. Jones, Dennis R. Kline, Susan N. Little, Kenneth M. Maleski, Pamela A. McIntosh, John L. Motzer, Gene F. Odato, Gary T. Pierotti, David T. Plunkett, William S. Ruxton, Lois M. Schimmel, Roy A. Siefert, Robert A. Smith, Alexander L. Stewart, Jr., Karen J. Sykes, Edward H. Uebler, Nancy M. Veronesi, Richard C. Whittaker, and Eric L. Wunz.

David R. Dickson applied FINSYS (Forest INventory SYStem), a generalized data-processing system, to the specific data needs of the Pennsylvania inventory, and produced summary tables for the state, geographic sampling units, and counties. Thomas W. Birch was instrumental in assuring that the area estimates were consistent with those from the two previous inventories, as well as in grouping the proper counties for detailed area and volume information. Teresa M. Bowers assisted in the inventory design by performing all calculations necessary for sample-size determination and plot selection. She was responsible for the coordination of keypunching and other data-preparation tasks. Flora C. Clements and Anne M. Malley helped to prepare and balance several of the statistical tables in this report.

James T. Bones, with the assistance of State personnel, collected and compiled the data on timber products output and timber removals. He was assisted in the compilation phase by David R. Dickson and Teresa M. Bowers.

Carmela M. Hyland was responsible for administrative and secretarial services. Catherine A. Logan typed the bulk of this report.

Manuscript received for publication August 6, 1980.

FOREST STATISTICS FOR PENNSYLVANIA--1978

THOMAS J. CONSIDINE, JR., and DOUGLAS S. POWELL, Research Foresters, Resources Evaluation, Northeastern Forest Experiment Station, USDA Forest Service, Broomall, Pa.

CONTENTS

INTRODUCTION 1
CURRENT HIGHLIGHTS.....1
    Forest area.....1
    Timber volume.....1
    Timber growth and removals.....2
RELIABILITY OF THE ESTIMATES 2
INDEX TO TABLES 3
    State level.....3
    Geographic unit level.....4
    County level.....5
LITERATURE CITED.....79
APPENDIX.....79
    Definition of terms.....79
    Log-grade classification.....82
    Commercial tree species of Pennsylvania.....86
    Metric equivalents of units used in this report.....88

INTRODUCTION

The USDA Forest Service inventories the forest resources of the Nation for assessment and planning activities authorized by the Renewable Resources Planning Act (RPA) of 1974 and the Renewable Resources Research Act of 1978. These inventories are conducted periodically in each state. Two previous inventories were conducted in Pennsylvania and reported on in 1958 and 1968. This report presents the forest resource data from the third inventory conducted in 1977-78. This inventory involved a cooperative effort of the Pennsylvania Department of Environmental Resources, Bureau of Forestry; the Allegheny National Forest; and the Northeastern Forest Experiment Station. Data from the most recent inventory of the Allegheny National Forest were updated to the present inventory date. The Bureau of Forestry conducted an intensive timber management inventory of the State Forest Lands in cooperation with the Resources Evaluation project and provided a computer data file of resource plot data to the USDA Forest Service. The Resources Evaluation project at the Northeastern Forest Experiment Station conducted an inventory on all private forest lands as well as the other public forest lands not mentioned above. The Resources Evaluation project developed the summaries of resource data and prepared this report.

The 1977-78 inventory conducted by the Resources Evaluation project followed a sampling procedure that utilized recent aerial photography, the partial remeasurement of ground samples from the earlier inventories, and the establishment of new ground sample locations. In Pennsylvania this required the remeasurement of 1,001 plots, the classification of 79,373 points on recent aerial photographs into land-use and cubic-foot volume classes, and the location and establishment of 1,743 new ground measurement locations as a subsample of the photo points. The data collected were summarized according to the Sampling with Partial Replacement (SPR) design by the FINSYS computer system developed by the Northeastern Forest Experiment Station.

The resurvey of Pennsylvania's forest resources involved several other companion studies and considerable analysis. An analytical report discussing the results of the reinventory, past trends, and future supply potentials is being prepared. Other publications describing the resource, the primary forest products industry, and the private forest-land owner are available. The forest area and timber volume statistics shown in this report are the summary of the information collected at nearly 3,500 field locations. Other information or additional summaries may be developed. If interested in either additional publications of more resource data, contact the Resources Evaluation Project, USDA Forest Service, 370 Reed Road, Broomall, PA 19008 (phone 215-461-3037).

CURRENT HIGHLIGHTS

Forest area

Pennsylvania is 58 percent forested. Ninety-five percent of the forest land, 15.9 million acres, is classified as commercial forest land.

Nearly 22 percent of Pennsylvania's commercial forest land, 3.5 million acres, is publicly owned--the highest total and percentage in the Northeast. The State has the largest holding of publicly-owned commercial forest land.

Nearly half of the commercial forest land is in sawtimber stands. Less than 2 percent is nonstocked.

Pennsylvania's forests are dominated by hardwoods. The oak-hickory and northern hardwoods forest-type groups cover 47 and 40 percent, respectively, of the commercial forest land.

Timber volume

Growing-stock volume is 21.8 billion cubic feet--an average of 1,366 cubic feet per acre. Sawtimber volume is 46.4 billion board feet--an average of 2,916 board feet per acre.

Ninety-two percent of the growing-stock volume is in hardwood species. Red maple is the species with the most volume--3.3 billion cubic feet.

Ninety-one percent of the sawtimber volume is in hardwood species. Northern red oak is the species with the most volume--7.7 billion board feet.

Thirty-seven percent of the hardwood sawtimber volume is in standard-lumber log grade 1 or 2.

Timber growth and removals

Growing-stock growth is estimated to be 2.2 times timber removals for 1977. Select white oaks is the only major species group showing removals exceeding growth.

Sawtimber growth is estimated to be 2.7 times removals for 1977. Northern red oak shows the largest annual growth of any species.

In 1976, 70 percent of timber removals from growing stock was utilized as a roundwood product. Ninety-three percent of sawtimber removals was utilized.

Sawlogs were the major timber product in 1976 and accounted for 41 percent of all growing-stock removals.

RELIABILITY OF THE ESTIMATES

Much of the data in this report were based on a carefully designed sample of forest conditions throughout the state. However, since we did not measure every tree or every acre in the state, the data are estimates. When judging the effectiveness of the estimating procedure we are concerned with two important criteria. First, how accurate is the estimate; and second, how precise or reliable is the estimate? Accuracy is the difference between the sample result and the true value or how much is really there. Reliability is the difference between a sample result and the result from a complete count or census using essentially the same definitions and procedures. We are chiefly interested in the accuracy of the sample but in most instances can only measure reliability.

We check the accuracy of our estimates as best we can. Drafts of the resource report are submitted to outside experts familiar with the resource situation. Should questions arise, the data are reviewed and reanalyzed, and discussions are held to resolve differences. We also compared our data with those provided by other agencies such as the USDA Soil Conservation Service and the Bureau of the Census. Also great care was taken in setting up the sample, carefully training field personnel, inspecting field work frequently, and checking office work.

Because of the care exercised in the survey process our estimates of reliability afford a reasonable measure of the survey's adequacy. The reliability of each estimate is given by its sampling error. An associated sampling error was calculated for each estimate in the report. Some appear in tables and all are available on request.

Here is an example of how to use sampling errors. The total growing-stock volume estimate of Pennsylvania--21,756 million cubic feet--is our best estimate. It has an associated sampling error of 0.8 percent, or 174.0 million cubic feet. This means that if there are no errors in procedure, the odds are 2 to 1 that if we repeated the survey in the same way, the resulting estimate of growing-stock volume would be between 21,582.1 and 21,930.1 million cubic feet, or 21,756.1 $\pm$ 174.0 million cubic feet. Similarly, the odds are 19 to 1 that the estimate would be $\pm$ 348.1 and 300 to 1 that it would be within $\pm$ 522.1 million cubic feet.

Because of the nature of sampling, estimates for the state totals are most reliable (that is, have the smallest sampling errors); followed by unit estimates and then county estimates. For example, our estimate of commercial forest land for the state has an associated error of 0.6 percent; the error for the Western Unit estimate is 2.3 percent; and the error for the Armstrong County estimate is 6 percent. Though the current county estimates are much improved over previous survey county estimates, they are still less reliable than the unit or statewide estimates. Resources Evaluation continues to pursue methods of providing more reliable, detailed information.

Since the 1965 survey, many definitions and procedures have changed as the result of refinements and improvements in forest inventory and data processing techniques. As a consequence, before any comparisons with the most recent information can be

made, the published area and volume estimates from the previous survey must be adjusted somewhat. The adjusted area figures are shown in Table 76. Timber volume adjustments are reflected in the following figures for growing-stock volume (in millions of cubic feet):

Species group	1965	1978	Change (1965-1978)
Hemlock	708	872	+ 164
Other softwoods	719	895	+ 176
All softwoods	1,427	1,767	+ 340
Select white oaks	1,459	1,382	- 77
Select red oaks	2,334	2,598	+ 264
Other oaks	3,112	3,361	+ 249
Maples	3,860	5,361	+1,501
Black cherry	1,457	1,892	+ 435
Other hardwoods	4,203	5,395	+1,192
All hardwoods	16,425	19,989	+3,564
All species	17,852	21,756	+3,904

For sawtimber volume, adjustments for the broad species groups are reflected in the following figures (in millions of board feet, International 1/4-inch rule):

Species group	1965	1978	Change (1965-1978)
Softwoods	3,217	4,329	+ 1,112
Hardwoods	28,079	42,097	+14,018

IF YOU WANT TO COMPARE 1978 AREA AND VOLUME ESTIMATES WITH COMPARABLE ESTIMATES FOR 1965, USE THE FIGURES IN TABLE 76 AND THE ABOVE FIGURES RATHER THAN THOSE PUBLISHED PREVIOUSLY.

Making comparisons will require some simple arithmetic to derive the proper figure for 1965. For example, if you want to compare the 1965 data on growing-stock volume in poletimber stands with the 1978 data, go back to the published data for 1965 (Ferguson 1968). Table 16 shows that the growing-stock volume in poletimber stands was 5,930 million cubic feet. This represented 33.2 percent of the total growing-stock volume of 17,860 million cubic feet.

To obtain the adjusted figure, multiply the 1965 proportion by the recalculated 1965 growing stock total. The calculation is 0.332) (17,852) = 5,927.3 million cubic feet. This is the figure to use for comparison with the corresponding 1978 figure of ,888.0 million cubic feet. Contact the esources Evaluation unit at the Northeastern orest Experiment Station if you need further ssistance in making comparisons. A more detailed explanation of the reasons for recalculation will appear in the analytical report of Pennsylvania's forest resource.

INDEX TO TABLES

State level

Area

1. Land area, by land class.....6

2. Land area, by geographic unit and land class.....7

3. Area of commercial forest land (CFL), by stand-size and ownership class.....8

4. Area of CFL, by geographic unit and stand-size class.....8

5. Area of CFL, by ownership class and geographic unit.....9

6. Area of CFL, by potential site productivity and ownership class.....10

7. Area of CFL, by geographic unit and potential site productivity class.....10

8. Area of CFL, by forest-type group and ownership class.....11

9. Area of CFL, by forest-type group and stand-size class.....11

10. Area of CFL, by forest-type group and geographic unit.....12

11. Area of CFL, by forest type and forest-type group.....13

Number of trees

12. Number of live trees on CFL, by tree and diameter class, softwoods and hardwoods.....14

13. Number of growing-stock trees on CFL, by species and diameter class.....15

Volume

14. Net volume of timber on CFL, by class of timber, softwoods and hardwoods.....16

15. Net volume of timber on CFL, by geographic unit and class of timber.....17

16. Net volume of growing stock and sawtimber on CFL, by geographic unit and stand-size class.....18

17. Net volume of growing stock and sawtimber on CFL, by geographic unit and ownership class..... 19

18. Net volume of growing stock and sawtimber on CFL, by forest-type group, softwoods and hardwoods..... 20

19. Net volume of growing stock and sawtimber on CFL, by forest-type group and geographic unit..... 21

20. Net volume of growing stock on CFL, by species and diameter class..... 22

21. Net volume of sawtimber on CFL, by species and diameter class..... 23

22. Net volume of sawtimber on CFL, by species and standard-lumber log grade..... 24

23. Sampling errors for major number of trees and timber-volume classes..... 25

Growth, removals, and mortality

24. Components of average annual net change of growing stock and sawtimber on CFL, by softwoods and hardwoods..... 26

25. Annual net growth, removals, and mortality of growing stock and sawtimber on CFL, by species..... 27

26. Annual net growth and removals of growing stock and sawtimber on CFL, by ownership class..... 28

Timber products output

27. Output of timber products, by source of material, softwoods and hardwoods..... 29

28. Output of roundwood products, by source, softwoods and hardwoods..... 30

29. Timber removals from growing stock and sawtimber on CFL, by item, softwoods and hardwoods..... 31

30. Volume of unused residues from primary manufacturing plants, by industry and type of residue, softwoods and hardwoods..... 32

Geographic unit level

Western Unit

31. Number of growing-stock trees on CFL, by species and diameter class..... 33

32. Net volume of growing stock on CFL, by species and diameter class..... 34

33. Net volume of sawtimber on CFL, by species and diameter class..... 35

34. Net volume of sawtimber on CFL, by species and standard-lumber log grade..... 36

35. Sampling errors for major number of trees and timber-volume classes..... 37

Southwestern Unit

36. Number of growing-stock trees on CFL, by species and diameter class..... 38

37. Net volume of growing stock on CFL, by species and diameter class..... 39

38. Net volume of sawtimber on CFL, by species and diameter class..... 40

39. Net volume of sawtimber on CFL, by species and standard-lumber log grade..... 41

40. Sampling errors for major number of trees and timber-volume classes..... 42

Allegheny Unit

41. Number of growing-stock trees on CFL, by species and diameter class..... 43

42. Net volume of growing stock on CFL, by species and diameter class..... 44

43. Net volume of sawtimber on CFL, by species and diameter class..... 45

44. Net volume of sawtimber on CFL, by species and standard-lumber log grade..... 46

45. Sampling errors for major number of trees and timber-volume classes..... 47

North-Central Unit

46. Number of growing-stock trees on CFL, by species and diameter class..... 48

47. Net volume of growing stock on CFL, by species and diameter class..... 49

48. Net volume of sawtimber on CFL, by species and diameter class..... 50

49. Net volume of sawtimber on CFL, by species and standard-lumber log grade..... 51

50. Sampling errors for major number of trees and timber-volume classes..... 52

South-Central Unit

1. Number of growing-stock trees on CFL, by pecies and diameter class.....53

2. Net volume of growing stock on CFL, by pecies and diameter class.....54

3. Net volume of sawtimber on CFL, by spe- ies and diameter class.....55

4. Net volume of sawtimber on CFL, by spe- ies and standard-lumber log grade.....56

5. Sampling errors for major number of rees and timber-volume classes.....57

Northeastern Unit

6. Number of growing-stock trees on CFL, by pecies and diameter class.....58

7. Net volume of growing-stock on CFL, by pecies and diameter class.....59

8. Net volume of sawtimber on CFL, by spe- ies and diameter class.....60

9. Net volume of sawtimber on CFL, by spe- ies and standard-lumber log grade.....61

0. Sampling errors for major number of rees and timber volume classes.....62

Pocono Unit

1. Number of growing-stock trees on CFL, by pecies and diameter class.....63

2. Net volume of growing stock on CFL, by pecies and diameter class.....64

3. Net volume of sawtimber on CFL, by spe- ies and diameter class.....65

4. Net volume of sawtimber on CFL, by spe- ies and standard-lumber log grade.....66

65. Sampling errors for major number of trees and timber-volume classes.....67

Southeastern Unit

66. Number of growing-stock trees on CFL, by species and diameter class.....68

67. Net volume of growing stock on CFL, by species and diameter class.....69

68. Net volume of sawtimber on CFL, by spe- cies and diameter class.....70

69. Net volume of sawtimber on CFL, by spe- cies and standard-lumber log grade.....71

70. Sampling errors for major number of trees and timber-volume classes.....72

County level

Area

71. Land area with sampling error, by county, geographic unit, and land class.....73

72. Area of CFL, by county, geographic unit, and stand-size class.....76

73. Area of CFL, by county, geographic unit, and major forest-type group.....77

Volume

74. Net volume of growing stock on CFL, by county, geographic unit, and major species group.....77

75. Net volume of sawtimber on CFL, by county, geographic unit, and major species group.....78

Area comparisons

76. Area of CFL, by county and geographic unit, 1965 and 1978.....78

Table 1.--Land area by land class, Pennsylvania, 1978.

Land class	Area		
	----Thousand acres ----		Percent
Commercial forest land		15,923.7	55
Noncommercial forest land:			
Productive reserved	532.0		2
Urban	72.0		W
Unproductive[a]	298.2		1
Total noncommercial		902.2	3
Total forest land		16,825.9	58
Nonforest land:			
Cropland[b]	4,778.6		17
Pasture[b]	1,587.8		6
Other[c]	5,585.9		19
Total nonforest		11,952.3	42
Total land area[d]		28,778.2	100

[a]Includes 223,625 acres on State Forest Land in stands 10 acres or larger occupied by tree species but where site and topography are inhibiting factors. The Bureau of Forestry anticipates no management practices on these lands due to shortness of merchantable stem, excessive rocks, or steepness of terrain.

[b]Source: U.S. Dep. Commer., Bur. Census, 1980. 1978 Census of Agriculture, preliminary report. AC79-P-42-000. p.1.

[c]Includes swampland, industrial and urban areas, other nonforest land, and 114,400 acres classed as water by Resources Evaluation standards, but defined by the Bureau of the Census as land.

[d]Source: U.S. Dep. Commer., Census, 1970 Census of Population, Vol. I, and Area Measurement Reports, Series GE-20, No. 1.

W-Less than 0.5 percent.

Table 2.--Land area, by geographic unit and land class, Pennsylvania, 1978.

(In thousands of acres)

Geographic unit	Forest land					Nonforest land	All land
	Commercial	Productive-reserved	Urban	Unproductive	Total		
Western	2,534.3	77.3	20.5	22.3	2,654.4	2,952.0	5,606.4
Southwestern	1,597.1	65.6	2.0	34.0	1,698.7	938.1	2,636.8
Allegheny	3,282.2	39.8	0.6	16.3	3,338.9	654.7	3,993.6
North-Central	2,859.8	51.3	1.6	143.5	3,056.2	972.6	4,028.8
South-Central	1,642.0	63.4	2.7	66.4	1,774.5	1,179.1	2,953.6
Northeastern	1,357.3	7.0	4.1	5.2	1,373.6	913.8	2,287.4
Pocono	1,656.7	141.8	2.9	7.4	1,808.8	939.3	2,748.1
Southeastern	994.3	85.8	37.6	3.1	1,120.8	3,402.7	4,523.5
Total	15,923.7	532.0	72.0	298.2	16,825.9	11,952.3	28,778.2

Table 3.--Area of Commercial forest land, by stand-size and ownership class, Pennsylvania, 1978.

Stand-size class	National Forest	Other public	Forest industry	Other private	All ownerships	Sampling error of total
	Thousand acres					Percent
Sawtimber stands	266.0	1,852.9	572.0	4,934.6	7,625.5	3
Poletimber stands	194.0	900.8	268.7	3,644.6	5,008.1	4
Sapling-seedling stands	24.0	232.2	123.4	2,704.1	3,083.7	6
Nonstocked areas	1.0	W	W	205.4	206.4	23
Total	485.0	2,985.9	964.1	11,488.7	15,923.7	0.6
Sampling error of total (percent)	(a)	(b)	20	3	0.6	

[a]The National Forest acreage is known without error.
[b]The other public acreage is primarily comprised of State Forest land which is known without error.
W-Less than 50 acres.

Table 4 .--Area of commercial forest land, by geographic unit and stand-size class, Pennsylvania, 1978.

(In thousands of acres)

Geographic unit	Sawtimber stands	Poletimber stands	Sapling-seedling stands	Nonstocked areas	All classes
Western	1,041.0	647.3	758.4	87.6	2,534.3
Southwestern	753.9	493.9	326.8	22.5	1,597.1
Allegheny	1,785.1	1,214.2	233.1	49.8	3,282.2
North-Central	1,533.8	811.0	490.8	24.2	2,859.8
South-Central	812.8	504.9	308.5	15.8	1,642.0
Northeastern	471.2	550.8	335.3	--	1,357.3
Pocono	537.2	648.4	471.1	--	1,656.7
Southeastern	690.5	137.6	159.7	6.5	994.3
Total	7,625.5	5,008.1	3,083.7	206.4	15,923.7

Table 5.--Area of commercial forest land, by ownership class and geographic unit, Pennsylvania, 1978.

(In thousands of acres)

Ownership class	Western	South-western	Allegheny	North-Central	South-Central	North-eastern	Pocono	South-eastern	Total
National Forest	--	--	485.0	--	--	--	--	--	485.0
Other federal	3.1	1.0	0.1	0.9	11.6	--	0.8	--	17.5
State	94.4	220.3	863.8	749.4	412.7	110.4	230.8	113.9	2,795.7
County and Municipal	11.3	46.5	15.2	21.6	20.5	8.9	27.5	21.2	172.7
Total public	108.8	267.8	1,364.1	771.9	444.8	119.3	259.1	135.1	3,470.9
Forest industry[a]	25.6	85.6	568.5	161.8	44.6	36.4	20.7	20.9	964.1
Farmer[b]	893.2	352.0	233.3	403.3	378.1	630.6	301.6	320.6	3,512.7
Miscellaneous private:									
Individual	1,160.1	646.7	596.4	951.2	579.6	406.3	489.1	360.9	5,190.3
Corporate	154.9	130.8	320.4	233.0	47.9	91.9	399.7	68.1	1,446.7
Other	191.7	114.2	199.5	338.6	147.0	72.8	186.5	88.7	1,339.0
Total private	2,425.5	1,329.3	1,918.1	2,087.9	1,197.2	1,238.0	1,397.6	859.2	12,452.8
Total, all ownerships	2,534.3	1,597.1	3,282.2	2,859.8	1,642.0	1,357.3	1,656.7	994.3	15,923.7
Sampling error of total (in percent)	2.3	1.8	1.0	1.0	1.0	2.1	1.0	2.0	0.6

[a] Includes unincorporated forest industry.
[b] Includes lands owned by part-time farmers and corporations engaged in agriculture.

Table 6.--Area of commercial forest land, by potential site productivity and ownership class, Pennsylvania, 1978.

Potential site productivity class[a]	National Forest	Other public	Forest industry	Other private	All ownerships	Sampling error of total
	Thousand acres					Percent
120 - 165	W	47.8	29.3	725.4	802.5	12
85 - 119	18.0	437.7	215.1	3,012.9	3,683.7	5
50 - 84	425.0	1,606.5	602.7	4,720.1	7,354.3	3
20 - 49	42.0	893.9	117.0	3,030.3	4,083.2	5
Total	485.0	2,985.9	964.1	11,488.7	15,923.7	

[a]Potential growth in cubic feet per acre per year.
W - Less than 50 acres.

Table 7.--Area of commercial forest land, by geographic unit and potential site productivity class, Pennsylvania, 1978.

(In thousands of acres)

Geographic unit	Potential site productivity class[a]				All classes
	120-165	85-119	50-84	20-49	
Western	246.6	915.5	1,055.5	316.7	2,534.3
Southwestern	85.6	428.9	722.8	359.8	1,597.1
Allegheny	90.7	671.3	1,924.0	596.2	3,282.2
North-Central	161.5	584.0	1,293.6	820.7	2,859.8
South-Central	75.4	331.7	748.9	486.0	1,642.0
Northeastern	86.6	347.7	523.4	399.6	1,357.3
Pocono	33.7	152.2	561.5	909.3	1,656.7
Southeastern	22.4	252.4	524.6	194.9	994.3
Total	802.5	3,683.7	7,354.3	4,083.2	15,923.7

[a]Potential growth in cubic feet per acre per year.

Table 8.--Area of commercial forest land, by forest-type group and ownership class, Pennsylvania, 1978.

(In thousands of acres)

Forest-type group	National Forest	Other public	Forest industry	Other private	All ownerships
White pine and hemlock	14.9	80.1	31.3	459.9	586.2
Spruce/fir	--	--	10.1	68.6	78.7
Scotch and Virginia pine	--	16.0	17.1	164.6	197.7
Oak/pine	--	31.7	--	101.5	133.2
Oak/hickory	105.4	1,753.3	366.2	5,285.2	7,510.1
Oak/gum	--	--	--	9.9	9.9
Elm/ash/red maple	--	11.9	--	587.7	599.6
Northern hardwoods	339.8	1,011.7	528.9	4,430.9	6,311.3
Aspen/birch	24.9	81.2	10.5	380.4	497.0
Total	485.0	2,985.9	964.1	11,488.7	15,923.7

Table 9.--Area of commercial forest land, by forest-type group and stand-size class, Pennsylvania, 1978.

(In thousands of acres)

Forest-type group	Saw-timber stands	Pole-timber stands	Sapling-seedling stands	Non-stocked areas	All stands
White pine and hemlock	370.6	143.9	71.7	--	586.2
Spruce/fir	15.1	28.2	35.4	--	78.7
Scotch and Virginia pine	49.1	45.5	103.1	--	197.7
Oak/pine	53.6	72.1	7.5	--	133.2
Oak/hickory	3,997.8	2,279.4	1,158.3	74.6	7,510.1
Oak/gum	--	9.9	--	--	9.9
Elm/ash/red maple	187.5	168.7	201.9	41.5	599.6
Northern hardwoods	2,923.2	2,093.2	1,225.3	69.6	6,311.3
Aspen/birch	28.6	167.2	280.5	20.7	497.0
Total	7,625.5	5,008.1	3,083.7	206.4	15,923.7

Table 10.--Area of commercial forest land, by forest-type group and geographic unit, Pennsylvania, 1978.

(In thousands of acres)

Forest-type group	Western	South-western	Allegheny	North-Central	South-Central	North-eastern	Pocono	South-eastern	Total
White pine and hemlock	32.7	26.6	90.6	235.9	31.1	106.3	61.7	1.3	586.2
Spruce/fir	43.7	--	--	9.6	15.1	--	--	10.3	78.7
Scotch and Virginia pine	48.0	10.9	11.0	21.8	67.6	--	21.0	17.4	197.7
Oak/pine	18.9	.6	.5	20.8	41.3	--	35.6	15.5	133.2
Oak/hickory	964.2	932.1	689.6	1,555.4	1,227.5	293.8	1,142.4	705.1	7,510.1
Oak/gum	9.9	--	--	--	--	--	--	--	9.9
Elm/ash/red maple	179.6	69.4	35.8	65.3	58.7	40.3	70.0	80.5	599.6
Northern hardwoods	1,126.7	557.5	2,253.3	858.1	200.4	865.8	285.3	164.2	6,311.3
Aspen/birch	110.6	--	201.4	92.9	.3	51.1	40.7	--	497.0
Total	2,534.3	1,597.1	3,282.2	2,859.8	1,642.0	1,357.3	1,656.7	994.3	15,923.7

Table 11--Area of commercial forest land, by forest type and forest-type group, Pennsylvania, 1978.

Forest type and forest-type group	Area	Sampling error
	Thousand acres	Percent
Red pine	67.5	36
White pine	224.2	21
White pine/hemlock	130.4	28
Hemlock	164.1	26
Total white pine and hemlock group	586.2	13
Red spruce/balsam fir	11.8	100
Tamarack	10.3	99
White spruce	9.6	100
Norway spruce	47.0	58
Total spruce/fir group	78.7	42
Scotch pine	90.6	35
Virginia pine	62.9	45
Eastern redcedar	6.4	103
Pitch pine	37.8	56
Total Scotch and Virginia pine group	197.7	24
Scotch pine/oak	6.6	76
Virginia pine/oak	76.5	35
Other oak/pine	50.1	44
Total oak/pine group	133.2	26
Post, black, or bear oak	771.9	11
Chestnut oak	1,816.6	7
White oak/red oak/hickory	856.1	10
White oak	573.6	13
Northern red oak	943.1	10
Yellow-poplar/white oak/ northern red oak	640.8	12
Red maple/central hardwoods	869.4	10
Black walnut	97.9	37
Central mixed hardwoods	940.7	10
Total oak/hickory group	7,510.1	3
Swamp chestnut oak/cherrybark oak	9.9	100
Total oak/gum group	9.9	100
Black ash/American elm/red maple	523.5	15
River birch/sycamore	49.8	45
Willow	26.3	70
Total elm/ash/red maple group	599.6	14
Sugar maple/beech/yellow birch	2,412.9	5
Black cherry	1,393.8	8
Red maple/northern hardwoods	1,324.1	8
Northern mixed hardwoods	1,180.5	9
Total northern hardwoods group	6,311.3	3
Aspen	457.1	17
Gray/paper birch	39.9	49
Total aspen/birch group	497.0	16
Total all groups	15,923.7	0.6

Table 12--Number of live trees on commercial forest land, by tree and diameter class, softwoods and hardwoods, Pennsylvania, 1978.

Diameter class (inches at breast height)	Softwoods					Hardwoods				
	Growing-stock	Sampling error	Rough and rotten	Sampling error	Total	Growing-stock	Sampling error	Rough and rotten	Sampling error	Total
	Thousand trees	Percent	Thousand trees	Percent	Thousand trees	Thousand trees	Percent	Thousand trees	Percent	Thousand trees
5.0 - 6.9	92,947	10	9,986	20	102,933	683,654	3	176,493	5	860,147
7.0 - 8.9	49,132	9	4,002	20	53,134	488,244	2	69,587	5	557,831
9.0 - 10.9	--		--		--	317,763	2	29,479	7	347,242
Total poletimber	142,079	8	13,988	17	156,067	1,489,661	2	275,559	3	1,765,220
9.0 - 10.9	29,056	11	4,816	18	33,872	--		--		--
11.0 - 12.9	17,861	9	2,335	17	20,196	180,305	3	20,325	6	200,630
13.0 - 14.9	7,472	11	1,183	20	8,655	100,537	3	8,955	7	109,492
Total small sawtimber	54,389	7	8,334	12	62,723	280,842	2	29,280	5	310,122
15.0 - 16.9	4,873	12	849	31	5,722	52,889	4	4,765	10	57,654
17.0 - 18.9	2,506	13	332	28	2,838	29,940	4	3,515	10	33,455
19.0 - 20.9	1,285	16	233	31	1,518	14,022	5	2,215	11	16,237
21.0 - 28.9	1,456	14	266	27	1,722	14,141	7	2,517	9	16,658
29.0 - and larger	88	41	25	80	113	1,300	13	628	3	1,928
Total large sawtimber	10,208	7	1,705	17	11,913	112,292	2	13,640	5	125,932
Total, all classes	206,676	5	24,027	10	230,703	1,882,795	1	318,479	4	2,201,274

Table 13.--Number of growing-stock trees on commercial forest land, by species and diameter class, Pennsylvania, 1978.

(In thousands of trees)

Species	Diameter class (inches at breast height)										All classes
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
White and red pines	23,345	13,960	9,686	4,758	1,880	1,473	1,136	457	804	73	57,572
Virginia pine	6,478	3,882	2,603	776	139	72	--	19	--	--	13,969
Other yellow pines	15,282	5,613	4,317	2,065	598	378	49	--	--	--	28,302
Hemlock	42,712	23,578	11,627	9,948	4,783	2,950	1,297	809	636	15	98,355
Other softwoods	5,130	2,099	823	314	72	--	24	--	16	--	8,478
Total softwoods	92,947	49,132	29,056	17,861	7,472	4,873	2,506	1,285	1,456	88	206,676
Select white oaks[a]	40,584	31,488	22,831	12,739	6,997	3,917	2,548	1,201	1,190	189	123,684
Northern red oak	42,207	36,085	31,588	23,381	13,912	9,299	5,694	3,499	3,423	368	169,456
Other oaks[b]	21,212	20,243	17,296	12,800	8,969	4,006	3,278	1,239	1,754	100	90,897
Chestnut oak	73,286	65,107	40,775	22,069	12,194	6,051	3,086	1,054	971	19	224,612
Hickory	13,157	13,555	9,379	5,671	2,963	1,419	765	200	383	22	47,514
Yellow birch	12,468	7,939	3,669	1,388	560	141	123	2	71	--	26,361
Sweet birch	53,416	30,213	14,154	4,939	2,293	1,338	426	190	168	--	107,137
Sugar maple	70,729	53,600	28,375	16,171	9,377	4,203	2,073	974	792	144	186,438
Red maples[c]	177,846	100,952	58,137	29,791	13,822	4,821	3,043	1,115	1,083	128	390,738
Beech	30,670	18,382	12,643	7,513	4,685	2,469	1,586	848	694	73	79,563
Blackgum	9,380	2,907	1,639	805	245	336	124	46	120	--	15,602
White ash	26,435	16,425	12,364	8,210	4,538	2,901	1,643	719	365	73	73,673
Aspen	27,621	19,233	12,000	4,041	1,511	423	52	18	--	--	64,899
Basswood	7,978	7,068	4,846	2,553	1,383	835	292	270	142	11	25,378
Yellow-poplar	7,309	5,178	5,312	4,544	3,458	2,540	1,288	789	1,202	93	31,713
Black walnut	3,888	1,715	1,121	553	441	529	54	74	84	--	8,459
Black cherry	44,602	39,817	30,528	18,333	10,034	5,691	3,178	1,382	1,130	47	154,742
Black locust	7,270	8,659	3,906	1,301	625	512	213	79	99	--	22,664
Other hardwoods	13,596	9,678	7,200	3,503	2,530	1,458	474	323	470	33	39,265
Total hardwoods	683,654	488,244	317,763	180,305	100,537	52,889	29,940	14,022	14,141	1,300	1,882,795
Total, All species	776,601	537,376	346,819	198,166	108,009	57,762	32,446	15,307	15,597	1,388	2,089,471

[a] Includes white, swamp white, and bur oaks.
[b] Includes scarlet, southern red, shingle, pin, willow, post and black oaks.
[c] Includes 1,547,000 silver maple trees.

Table 14.--Net volume of timber on commercial forest land, by class of timber, softwoods and hardwoods, Pennsylvania, 1978.

Class of timber	Softwoods	Hardwoods	All species	Sampling error of total
	Million cubic feet			Percent
Sawtimber trees:				
Sawlog portion	1,013.4	8,673.0	9,686.4	2
Upper-stem portion	130.7	2,073.8	2,204.5	1
All sawtimber trees	1,144.1	10,746.8	11,890.9	1
Poletimber trees	622.9	9,242.3	9,865.2	2
All growing-stock trees	1,767.0	19,989.1	21,756.1	1
Rough trees	174.7	1,197.6	1,372.3	4
Rotten trees	19.2	439.3	458.5	4
Total, all timber	1,960.9	21,626.0	23,586.9	0.8

Table 15.--Net volume of timber on commercial forest land, by geographic unit and class of timber, Pennsylvania, 1978.

Geographic unit	Growing-stock trees			Rough trees	Rotten trees	All trees	Sampling error[a]
	Poletimber	Sawtimber	Total				
	Million cubic feet						Percent
Western	914.0	1,283.8	2,197.8	235.7	43.4	2,476.9	2.7
Southwestern	886.6	1,040.0	1,926.6	165.4	42.5	2,134.5	2.8
Allegheny	2,970.4	3,284.0	6,254.4	334.7	139.1	6,728.2	1.3
North-Central	1,671.1	2,052.3	3,723.4	170.6	71.2	3,965.2	1.8
South-Central	916.9	1,459.7	2,376.6	110.9	41.7	2,529.2	1.9
Northeastern	980.3	851.3	1,831.6	154.8	60.3	2,046.7	2.5
Pocono	1,027.4	774.4	1,801.8	113.6	41.2	1,956.6	2.5
Southeastern	498.5	1,145.4	1,643.9	86.6	19.1	1,749.6	3.5
Total	9,865.2	11,890.9	21,756.1	1,372.3	458.5	23,586.9	0.8

[a]For volume of all trees.

Table 16.--Net volume of growing stock and sawtimber on commercial forest land, by geographic unit and stand-size class, Pennsylvania, 1978.

Geographic unit	Sawtimber stands	Poletimber stands	Sapling-seedling stands	Nonstocked areas	All classes
			GROWING STOCK		
			Million cubic feet		
Western	1,412.4	593.8	191.6	--	2,197.8
Southwestern	1,221.7	604.2	100.7	--	1,926.6
Allegheny	3,960.5	2,247.0	46.9	--	6,254.4
North-Central	2,627.3	941.4	152.6	2.1	3,723.4
South-Central	1,630.7	640.3	105.6	--	2,376.6
Northeastern	915.6	831.8	84.2	--	1,831.6
Pocono	801.5	840.0	160.3	--	1,801.8
Southeastern	1,396.8	189.5	57.6	--	1,643.9
Total	13,966.5	6,888.0	899.5	2.1	21,756.1
Sampling error of total (percent)	2	4	9	102	0.8
			SAWTIMBER		
			Million board feet[a]		
Western	4,502.1	871.9	377.2	--	5,751.2
Southwestern	3,911.9	676.5	185.7	--	4,774.1
Allegheny	10,341.2	2,618.4	70.9	--	13,030.5
North-Central	7,024.6	1,104.2	142.5	--	8,271.3
South-Central	3,971.1	769.8	127.1	--	4,868.0
Northeastern	2,281.3	790.9	95.5	--	3,167.7
Pocono	1,724.1	843.3	131.8	--	2,699.2
Southeastern	3,534.2	234.0	95.6	--	3,863.8
Total	37,290.5	7,909.0	1,226.3	--	46,425.8
Sampling error of total (percent)	2	6	13	--	1.1

[a]International 1/4-inch rule.

Table 17.--Net volume of growing stock and sawtimber on commercial forest land, by geographic unit and ownership class, Pennsylvania, 1978.

Geograqphic unit	National Forest	Other public	Forest industry	Other private	Total	Sampling error of total
	GROWING STOCK					
	Million cubic feet					Percent
Western	--	97.4	37.3	2,063.1	2,197.8	2.9
Southwestern	--	471.2	89.7	1,365.7	1,926.6	3.0
Allegheny	1,326.0	1,796.7	924.0	2,207.7	6,254.4	1.3
North-Central	--	1,082.1	219.4	2,421.9	3,723.4	1.9
South-Central	--	797.5	83.5	1,495.6	2,376.6	1.9
Northeastern	--	212.8	36.3	1,582.5	1,831.6	2.6
Pocono	--	304.3	32.3	1,465.2	1,801.8	2.6
Southeastern	--	186.2	33.5	1,424.2	1,643.9	3.4
Total	1,326.0	4,948.2	1,456.0	14,025.9	21,756.1	0.8
Sampling error of total (percent)	4	4	10	2	0.8	
	SAWTIMBER					
	Million board feet[a]					
Western	--	233.9	67.3	5,450.0	5,751.2	3.6
Southwestern	--	1,227.0	265.0	3,282.1	4,774.1	4.2
Allegheny	2,338.9	3,916.9	2,003.9	4,770.8	13,030.5	2.1
North-Central	--	2,444.0	529.2	5,298.1	8,271.3	2.6
South-Central	--	1,765.5	210.5	2,892.0	4,868.0	2.7
Northeastern	--	322.7	41.1	2,803.9	3,167.7	3.4
Pocono	--	452.7	43.6	2,202.9	2,699.2	4.5
Southeastern	--	422.8	47.0	3,394.0	3,863.8	4.2
Total	2,338.9	10,785.5	3,207.6	30,093.8	46,425.8	1.1
Sampling error of total (percent)	7	5	12	3	1.1	

[a] International 1/4-inch rule.

Table 18.--Net volume of growing stock and sawtimber on commercial forest land, by forest-type group, softwoods, and hardwoods, Pennsylvania, 1978.

Forest-type group	Growing stock			Sawtimber		
	Softwoods	Hardwoods	All species	Softwoods	Hardwoods	All species
	Million cubic feet			Million board feet[a]		
White pine and hemlock	573.3	353.6	926.9	1,366.6	634.9	2,001.5
Spruce/fir	26.1	16.3	42.4	48.0	14.9	62.9
Shortleaf and Virginia pine	111.4	22.2	133.6	157.3	23.8	181.1
Oak/pine	45.7	72.3	118.0	104.6	103.0	207.6
Oak/hickory	343.7	10,028.9	10,372.6	937.7	21,815.0	22,752.7
Oak/gum	--	11.5	11.5	--	16.9	16.9
Elm/ash/red maple	25.4	476.2	501.6	69.4	1,083.3	1,152.7
Northern hardwoods	628.3	8,777.3	9,405.6	1,635.6	18,191.1	19,826.7
Aspen/birch	13.1	230.8	243.9	9.7	214.0	223.7
Total	1,767.0	19,989.1	21,756.1	4,328.9	42,096.9	46,425.8

[a]International 1/4-inch rule.

Table 19 .--Net volume of growing stock and sawtimber on commercial forest land, by forest-type group and geographic unit, Pennsylvania, 1978.

Forest-type group	Western	South-western	Allegheny	North-Central	South-Central	North-eastern	Pocono	South-eastern	All units
	GROWING STOCK Million cubic feet								
White pine and hemlock	80.8	24.1	151.1	292.4	58.8	228.3	91.1	0.3	926.9
Spruce/fir	12.2	--	--	1.0	23.5	--	--	5.7	42.4
Scotch and Virginia pine	33.3	0.4	0.7	11.4	44.8	--	23.1	19.9	133.6
Oak/pine	25.8	W	--	12.5	30.0	--	47.7	2.0	118.0
Oak/hickory	870.6	1,193.3	1,381.6	2,088.6	1,923.1	342.4	1,205.8	1,367.2	10,372.6
Oak/gum	11.5	--	--	--	--	--	--	--	11.5
Elm/ash/red maple	108.9	64.3	37.5	70.0	41.5	29.2	66.6	83.6	501.6
Northern hardwoods	1,011.6	644.5	4,549.5	1,200.3	254.8	1,213.9	365.8	165.2	9,405.6
Aspen/birch	43.1	W	134.0	47.2	0.1	17.8	1.7	W	243.9
Total	2,197.8	1,926.6	6,254.4	3,723.4	2,376.6	1,831.6	1,801.8	1,643.9	21,756.1
	SAWTIMBER Million board feet[a]								
White pine and hemlock	162.0	39.4	261.5	736.0	85.8	541.0	175.0	0.8	2,001.5
Spruce/fir	27.9	--	--	--	33.1	--	--	1.9	62.9
Scotch and Virginia pine	32.3	0.1	--	6.5	68.7	--	29.4	44.1	181.1
Oak/pine	58.5	0.1	--	22.0	44.1	--	77.0	5.9	207.6
Oak/hickory	2,453.0	2,856.6	3,147.1	4,725.9	4,028.6	532.7	1,806.2	3,202.6	22,752.7
Oak/gum	16.9	--	--	--	--	--	--	--	16.9
Elm/ash/red maple	355.2	174.9	77.3	139.8	64.8	74.8	63.7	202.2	1,152.7
Northern hardwoods	2,618.8	1,703.0	9,416.2	2,583.3	542.8	2,008.4	547.9	406.3	19,826.7
Aspen/birch	26.6	W	128.4	57.8	0.1	10.8	W	W	223.7
Total	5,751.2	4,774.1	13,030.5	8,271.3	4,868.0	3,167.7	2,699.2	3,863.8	46,425.8

[a] International 1/4-inch rule.

W Less than 50,000 cubic or board feet.

Table 20 .--Net volume of growing stock on commercial forest land, by species and diameter class, Pennsylvania, 1978.

(In millions of cubic feet)

Species	Diameter class (inches at breast height)										All classes
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
White and red pines	120.7	109.4	108.9	76.8	45.0	44.2	48.2	24.2	55.1	8.5	641.0
Virginia pine	10.4	19.4	24.6	11.8	2.9	1.8	--	0.7	--	--	71.6
Other yellow pines	26.6	23.9	38.4	30.7	14.3	14.5	1.9	--	--	--	150.3
Hemlock	157.1	136.6	108.8	142.4	101.0	85.0	50.9	41.1	46.5	2.3	871.7
Other softwoods	9.3	9.5	7.1	3.8	1.1	--	0.8	--	0.8	--	32.4
Total softwoods	324.1	298.8	287.8	265.5	164.3	145.5	101.8	66.0	102.4	10.8	1,767.0
Select white oaks[a]	121.7	193.0	245.2	220.5	179.0	133.3	114.8	70.1	84.6	20.1	1,382.3
Northern red oak	148.2	236.4	362.8	424.7	358.7	319.0	253.4	192.1	259.6	42.8	2,597.7
Other oaks[b]	76.7	129.8	188.1	218.1	216.5	131.8	148.1	67.6	115.9	10.5	1,303.1
Chestnut oak	234.8	385.3	408.9	343.1	276.4	177.4	120.0	51.7	58.5	2.3	2,058.4
Hickory	48.4	92.2	107.3	103.6	77.1	52.1	33.5	10.6	30.5	1.0	556.3
Yellow birch	44.2	51.5	38.0	22.0	12.8	4.1	4.0	0.1	4.3	--	181.0
Sweet birch	186.6	198.0	146.2	75.9	46.7	39.3	15.7	8.4	11.3	--	728.1
Sugar maple	304.8	415.7	355.7	307.4	245.5	143.7	90.6	51.8	56.5	19.2	1,990.9
Red maples[c]	636.1	718.3	689.0	539.4	354.5	165.2	129.1	56.1	65.1	16.7	3,369.5
Beech	120.5	136.8	144.3	135.8	119.5	82.3	68.0	44.9	43.1	5.6	900.8
Blackgum	33.2	19.2	16.0	12.3	7.1	11.0	6.3	2.6	9.2	--	116.9
White ash	86.7	112.1	144.8	152.2	122.2	101.8	75.7	45.4	28.0	10.6	879.5
Aspen	85.8	122.8	138.9	76.1	38.2	15.3	2.5	0.9	--	--	480.5
Basswood	32.0	55.2	69.0	61.0	45.7	36.4	15.3	17.2	9.4	1.0	342.2
Yellow-poplar	26.6	31.7	60.5	78.6	86.7	87.1	56.0	43.0	76.8	11.9	558.9
Black walnut	8.1	7.0	9.6	7.9	10.4	15.4	2.3	3.5	3.3	--	67.5
Black cherry	152.7	248.4	347.1	333.4	266.2	207.9	149.4	82.2	99.5	5.5	1,892.3
Black locust	17.7	47.2	40.4	20.3	17.1	18.1	8.8	3.7	5.9	--	179.2
Other hardwoods	40.2	52.2	72.7	56.3	63.5	45.8	18.8	18.1	30.4	6.0	404.0
Total hardwoods	2,405.0	3,252.8	3,584.5	3,188.6	2,543.8	1,787.0	1,312.3	770.0	991.9	153.2	19,989.1
Total, all species	2,729.1	3,551.6	3,872.3	3,454.1	2,708.1	1,932.5	1,414.1	836.0	1,094.3	164.0	21,756.1

a Includes white, swamp white and bur oaks.
b Includes scarlet, southern red, shingle, pin, willow, post, and black oaks.
c Includes 25.8 million cubic feet of silver maple.

Table 21.--Net volume of sawtimber on commercial forest land, by species and diameter class, Pennsylvania, 1978.

(In millions of board feet)[a]

Species	Diameter class (inches at breast height)								All classes
	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
White and red pines	349.2	277.7	177.9	185.8	211.9	105.6	255.5	40.3	1,603.9
Virginia pine	66.9	40.6	10.6	8.0	--	3.5	--	--	129.6
Other yellow pines	117.7	109.9	59.4	65.5	7.7	--	--	--	360.2
Hemlock	335.9	503.3	393.0	347.6	218.3	166.0	212.5	10.5	2,187.1
Other softwoods	20.7	15.4	5.4	--	3.3	--	3.3	--	48.1
Total softwoods	890.4	946.9	646.3	606.9	441.2	275.1	471.3	50.8	4,328.9
Select white oaks[b]	--	764.5	650.2	528.2	474.3	294.5	388.1	115.2	3,215.0
Northern red oak	--	1,560.6	1,432.4	1,332.1	1,070.7	858.1	1,212.9	201.8	7,668.6
Other oaks[c]	--	778.6	837.0	507.2	605.5	281.9	507.0	55.6	3,572.8
Chestnut oak	--	1,167.8	982.8	716.7	467.9	219.2	239.3	11.2	3,804.9
Hickory	--	351.5	286.2	203.0	141.6	41.3	124.5	9.3	1,157.4
Yellow birch	--	72.5	44.0	16.6	17.6	0.5	12.4	--	163.6
Sweet birch	--	253.5	175.7	155.2	48.3	30.4	47.3	--	710.4
Sugar maple	--	1,082.7	985.3	618.3	380.5	240.7	275.3	92.3	3,675.1
Red maples[d]	--	1,800.0	1,326.5	676.2	551.9	258.6	316.4	74.2	5,003.8
Beech	--	455.7	458.2	340.1	279.6	186.0	205.0	32.8	1,957.4
Blackgum	--	41.1	28.0	43.5	26.1	8.8	36.9	--	184.4
White ash	--	508.4	449.6	407.4	335.7	196.3	120.0	49.6	2,067.0
Aspen	--	273.8	158.0	64.8	11.5	4.9	--	--	513.0
Basswood	--	219.0	189.8	155.3	60.4	74.5	41.0	3.3	743.3
Yellow-poplar	--	258.7	330.5	325.3	227.9	195.7	343.2	44.6	1,725.9
Black walnut	--	27.8	36.4	74.2	8.2	17.4	21.9	--	185.9
Black cherry	--	1,147.5	1,028.1	858.6	632.9	364.6	438.9	29.8	4,500.4
Black locust	--	70.4	59.9	68.1	37.1	14.8	30.5	--	280.8
Other hardwoods	--	190.2	242.1	196.4	86.5	80.0	145.0	27.0	967.2
Total hardwoods	--	11,024.3	9,700.7	7,287.2	5,464.2	3,368.2	4,505.6	746.7	42,096.9
Total, all species	890.4	11,971.2	10,347.0	7,894.1	5,905.4	3,643.3	4,976.9	797.5	46,425.8

a International 1/4-inch rule.
b Includes white, swamp white, and bur oaks.
c Includes scarlet, shingle, pin, willow, and black oaks.
d Includes 78.1 million board feet of silver maple.

Table 22 .--Net volume of sawtimber on commercial forest land, by species and standard-lumber log grade, Pennsylvania, 1978.

(In millions of board feet)[a]

Species	Grade 1	Grade 2	Grade 3	Grade 4[b]	All classes
White and red pines	58.3	209.0	787.1	549.5	1,603.9
Yellow pines	26.6	66.6	396.6	--	489.8
Other softwoods[c]	--	--	--	--	2,235.2
Total softwoods	84.9	275.6	1,183.7	549.5	4,328.9
Select white oaks[d]	518.7	646.0	1,391.8	658.5	3,215.0
Northern red oak	2,032.8	1,851.1	2,981.5	803.2	7,668.6
Other oaks[e]	530.6	699.2	1,447.8	895.2	3,572.8
Chestnut oak	382.7	909.3	1,894.1	618.8	3,804.9
Hickory	92.5	215.9	572.8	276.2	1,157.4
Yellow birch	5.9	32.3	101.3	24.1	163.6
Sweet birch	57.6	158.5	396.7	97.6	710.4
Sugar maple	533.2	813.8	1,778.4	549.7	3,675.1
Red maples[f]	280.7	849.3	3,066.7	807.1	5,003.8
Beech	142.8	319.2	1,002.0	493.4	1,957.4
Blackgum	23.9	41.0	92.3	27.2	184.4
White ash	453.8	526.6	845.4	241.2	2,067.0
Aspen	14.2	74.8	305.8	118.2	513.0
Basswood	91.9	149.9	428.0	73.5	743.3
Yellow-poplar	410.9	390.4	633.1	291.5	1,725.9
Black walnut	32.2	27.4	106.0	20.3	185.9
Black cherry	660.1	1,060.6	2,270.1	509.6	4,500.4
Black locust	7.4	41.2	197.5	34.7	280.8
Other hardwoods	155.5	209.2	479.3	123.2	967.2
Total hardwoods	6,427.4	9,015.7	19,990.6	6,663.2	42,096.9
Hardwood quality (in percent)	15	21	48	16	100
Hardwood Sampling error (in percent)	3	2	2	2	13

[a] International 1/4-inch rule.

[b] Grade 4 applies only to white pine. For hardwoods the volumes in this column are for construction logs.

[c] Species other than pine are not graded into standard-lumber grades.

[d] Includes white, swamp white, and bur oaks.

[e] Includes scarlet, shingle, pin, willow, and black oaks.

[f] Includes 78.1 million board feet of silver maple.

Table 23.--Sampling errors for major number of trees and timber-volume classes, Pennsylvania, 1978.

(In percent)

Species	Number of trees (Table 13)	Growing-stock volume (Table 20)	Sawtimber volume (Table 21)
White and red pines	14	12	12
Virginia pine	26	30	32
Other yellow pines	19	15	17
Hemlock	10	8	9
Other softwoods	37	34	48
Select white oaks	6	5	6
Northern red oak	5	4	5
Other oaks	6	6	6
Chestnut oak	5	5	6
Hickory	9	9	11
Yellow birch	12	11	17
Sweet birch	8	7	11
Sugar maple	6	6	7
Red maples	4	4	6
Beech	8	7	9
Blackgum	13	12	19
White ash	8	7	8
Aspen	10	9	14
Basswood	15	13	14
Yellow-poplar	12	11	12
Black walnut	31	22	30
Black cherry	7	6	7
Black locust	18	17	23
Other hardwoods	11	10	12
Dbh classes (inches)			
5.0 to 6.9	3	3	--
7.0 to 8.9	2	2	--
9.0 to 10.9	2	2	11
11.0 to 12.9	2	2	2
13.0 to 14.9	3	2	2
15.0 to 16.9	3	3	3
17.0 to 18.9	4	4	3
19.0 to 20.9	5	5	4
21.0 to 28.9	6	5	4
29.0 +	13	13	12

Table 24.--Components of average annual net change of growing stock and sawtimber on commercial forest land, by softwoods and hardwoods, Pennsylvania, 1964-1977.

Component	Softwoods	Hardwoods	All species
	GROWING STOCK		
	Million cubic feet		
Accretion[a]	19	501	520
Ingrowth[b]	40	140	180
Gross growth	59	641	700
Cull increment	-1	-39	-40
Mortality	-4	-101	-105
Net growth	54	501	555
Removals	-28	-227	-255
Inventory change	26	274	300
	SAWTIMBER		
	Million board feet[c]		
Accretion[d]	86	903	989
Ingrowth[e]	60	1,066	1,126
Gross growth	146	1,969	2,115
Cull increment	-4	-61	-65
Mortality	-11	-160	-171
Net growth	131	1,748	1,879
Removals[f]	-45	-670	-715
Inventory change	86	1,078	1,164

[a] Growth on initial growing-stock inventory, including trees that were subsequently cut.

[b] Volume of trees that became 5.0-inches dbh or larger during the period between inventories.

[c] International 1/4-inch rule.

[d] Growth on initial sawtimber inventory, including trees that were subsequently cut.

[e] Volume of trees that became sawtimber size during the period between inventories.

[f] During the past decade that portion of removals due to land reclassification has been exceptionally high. In order to avoid overestimation of removals on the current forest land base, a portion of the removals due to land reclassification has been excluded from this figure.

Table 25.--Annual net growth, removals, and mortality of growing stock and sawtimber on commercial forest land, by species, Pennsylvania, 1977.

Species	Growing stock			Sawtimber		
	Net growth	Timber removals[a]	Mortality	Net growth	Timber removals[a]	Mortality
	Million cubic feet			Million board feet[b]		
Hemlock	32	18	3	126	68	11
Other softwoods	28	13	2	59	19	8
Total softwoods	60	31	5	185	87	19
Select white oaks	26	32	11	171	130	21
Northern red oaks	66	45	15	330	139	50
Chestnut oak	34	22	15	181	80	21
Other oaks	39	31	11	153	87	25
Red maples	82	17	5	248	36	8
Sugar maple	92	21	8	271	56	4
Black cherry	60	22	5	197	60	2
Other hardwoods	148	58	35	457	130	47
Total hardwoods	547	248	105	2,008	718	178
Total, all species	607	279	110	2,193	805	197

[a]Data for timber removals in this table are based on the trend from 1964 through 1977 and differ from those shown in Table 29. Table 29 reports the results of a canvass of timber removals for 1976. During the past decade that portion of removals due to land reclassification has been exceptionally high. In order to avoid overestimation of removals on the current forest land base, a portion of the removals due to land reclassification has been excluded from this figure.

[b]International 1/4-inch rule.

Table 26.--Annual net growth and removals of growing stock and sawtimber on commercial forest land, by ownership class, Pennsylvania, 1977.

Ownership	Net growth	Timber removals[a]
	GROWING STOCK	
	Million cubic feet	
Public	236	55
Forest industry	33	21
Other private	338	203
Total	607	279
	SAWTIMBER	
	Million board feet[b]	
Public	695	147
Forest industry	189	102
Other private	1,309	556
Total	2,193	805

[a]Data for timber removals in this table are based on the trend from 1964 through 1977 and differ from those shown in Table 29. Table 29 reports the results of a canvass of timber removals for 1976. During the past decade that portion of removals due to land reclassification has been exceptionally high. In order to avoid overestimation of removals on the current forest land base, a portion of the removals due to land reclassification has been excluded from this figure.

[b]International 1/4-inch rule.

Table 27.--Output of timber products, by source of material, softwoods, and hardwoods, Pennsylvania, 1976[a].

Product and species group	Standard units	Output from roundwood		Output from Manufacturing residues		Total output	
		Number of units	Thousand cubic feet	Number of units	Thousand cubic feet	Number of units	Thousand cubic feet
Sawlogs							
Softwood	Mbf[b]	52,846	8,715	--	--	52,846	8,715
Hardwood	Mbf	591,312	94,988	--	--	591,312	94,988
Total	Mbf	644,158	103,703	--	--	644,158	103,703
Veneer logs and bolts							
Softwood	Mbf	--	--	--	--	--	--
Hardwood	Mbf	14,739	2,073	--	--	14,739	2,073
Total	Mbf	14,739	2,073	--	--	14,739	2,073
Pulpwood							
Softwood	Std cords[c]	35,890	3,051	20,255	1,722	56,145	4,773
Hardwood	Std cords	589,313	50,092	263,987	22,438	853,300	72,530
Total	Std cords	625,203	53,143	284,242	24,160	909,445	77,303
Cooperage logs and bolts							
Softwood	Mbf	--	--	--	--	--	--
Hardwood	Mbf	4,224	538	--	--	4,224	538
Total	Mbf	4,224	538	--	--	4,224	538
Posts (round and split)							
Softwood	M pieces	--	--	--	--	--	--
Hardwood	M pieces	270	231	--	--	270	231
Total	M pieces	270	231	--	--	270	231
Mine timbers (round)							
Softwood	Mft^3	163	163	--	--	163	163
Hardwood	Mft^3	4,398	4,398	--	--	4,398	4,398
Total	Mft^3	4,561	4,561	--	--	4,561	4,561
Other[d]							
Softwood	Mft^3	125	125	170	170	295	295
Hardwood	Mft^3	1,680	1,680	2,390	2,390	4,070	4,070
Total	Mft^3	1,805	1,805	2,560	2,560	4,365	4,365
Total industrial products							
Softwood	Mft^3		12,054		1,892		13,946
Hardwood	Mft^3		154,000		24,828		178,828
Total	Mft^3		166,054		26,720		192,774
Fuelwood							
Softwood	Std cords[e]	--	--	6,525	522	6,525	522
Hardwood	Std cords	130,000	10,400	110,650	8,852	240,650	19,252
Total	Std cords	130,000	10,400	117,175	9,374	247,175	19,774
All products[f]							
Softwood	Mft^3		12,054		2,414		14,468
Hardwood	Mft^3		164,400		33,680		198,080
Total	Mft^3		176,454		36,094		212,548

[a] Source of data: Bones and Sherwood 1979.
[b] International 1/4-inch rule.
[c] Rough wood basis, includes both production from roundwood and chips from manufacturing residues, equivalent to 85 ft^3 of solid wood.
[d] Includes handle and bat stock, charcoal wood, and wood fiber products.
[e] Rough wood basis, includes both production from roundwood and chips from manufacturing residues, equivalent to 80 ft^3 of solid wood.
[f] Does not include 1,045,000 cubic feet of softwood and 12,694,000 cubic feet of hardwood residues used for livestock bedding and farm and horticultural mulch.

Table 28.--Output of roundwood products, by source, softwoods and hardwoods, Pennsylvania, 1976[a].

(In thousands of cubic feet)

Product and species group	Growing-stock trees[b]			Rough and rotten trees[b]	Salvable dead trees[b]	Other sources[c]	All sources
	Poletimber	Sawtimber	Total				
PRINCIPAL INDUSTRIAL PRODUCTS							
Sowlogs							
Softwood	29	8,577	8,606	6	--	103	8,715
Hardwood	1,543	90,686	92,229	1,262	--	1,497	94,988
Total	1,572	99,263	100,835	1,268	--	1,600	103,703
Veneer logs and bolts							
Softwood	--	--	--	--	--	--	--
Hardwood	34	2,006	2,040	--	--	33	2,073
Total	34	2,006	2,040	--	--	33	2,073
Pulpwood							
Softwood	2,146	312	2,458	14	--	579	3,051
Hardwood	17,275	31,056	48,331	128	118	1,515	50,092
Total	19,421	31,368	50,789	142	118	2,094	53,143
MISCELLANEOUS INDUSTRIAL PRODUCTS							
Cooperage logs and bolts							
Softwood	--	--	--	--	--	--	--
Hardwood	9	520	529	--	--	9	538
Total	9	520	529	--	--	9	538
Posts (round and split)							
Softwood	--	--	--	--	--	--	--
Hardwood	167	56	223	1	--	7	231
Total	167	56	223	1	--	7	231
Mine timbers (round)							
Softwood	115	17	132	1	--	30	163
Hardwood	1,516	2,727	4,243	11	11	133	4,398
Total	1,631	2,744	4,375	12	11	163	4,561
Other							
Softwood	43	78	121	--	--	4	125
Hardwood	579	1,042	1,621	4	4	51	1,680
Total	622	1,120	1,742	4	4	55	1,805
TOTAL INDUSTRIAL PRODUCTS							
Softwood	2,333	8,984	11,317	21	--	716	12,054
Hardwood	21,123	128,093	149,216	1,406	133	3,245	154,000
Total	23,456	137,077	160,533	1,427	133	3,961	166,054
NONINDUSTRIAL PRODUCTS							
Fuelwood							
Softwood	--	--	--	--	--	--	--
Hardwood	3,586	6,449	10,035	26	25	314	10,400
Total	3,586	6,449	10,035	26	25	314	10,400
ALL PRODUCTS							
Softwood	2,333	8,984	11,317	21	--	716	12,054
Hardwood	24,709	134,542	159,251	1,432	158	3,559	164,400
Total	27,042	143,526	170,568	1,453	158	4,275	176,454

[a] Source of data: Bones and Sherwood 1979.

[b] On commercial forest land.

[c] Includes trees less than 5.0 inches in diameter, tree tops and limbs from commercial forest areas, or any material from noncommercial forest land or nonforest land such as fence rows and suburban areas.

Table 29.--Timber removals from growing stock and sawtimber on commercial forest land, by item, softwoods and hardwoods, Pennsylvania, 1976.[a]

Item	Growing stock			Sawtimber		
	Softwoods	Hardwoods	All species	Softwoods	Hardwoods	All species
	-----Thousand cubic feet-----			----Thousand board feet[b]-----		
Roundwood products:						
Sawlogs	8,606	92,229	100,835	41,677	420,504	462,181
Veneer logs and bolts	--	2,040	2,040	--	9,296	9,296
Pulpwood	2,458	48,331	50,789	1,095	137,808	138,903
Cooperage logs and bolts	--	529	529	--	2,413	2,413
Piling	--	--	--	--	--	--
Poles	--	--	--	--	--	--
Posts	--	223	223	--	248	248
Mine timbers	132	4,243	4,375	59	12,100	12,159
Other	121	1,621	1,742	363	4,622	4,985
Fuelwood	--	10,035	10,035	--	28,615	28,615
All products	11,317	159,251	170,568	43,194	615,606	658,800
Logging residues	1,148	53,245	54,393	780	19,134	19,914
Land clearing	1,170	14,030	15,200	2,405	26,842	29,247
Land classification	2,135	27,305	29,440	4,625	58,523	63,148
Total removals	15,770	253,831	269,601	51,004	720,105	771,109

[a]Source of data: Bones and Sherwood 1979.
[b]International 1/4-inch rule.

Table 30.--Volume of unused residues from primary manufacturing plants, by industry and type of residue, softwoods and hardwoods, Pennsylvania, 1976.[a]

(In thousands of cubic feet)

Species group and type of residue	Lumber	Veneer and plywood	Other	All industries
Softwoods				
Coarse[b]	532	--	--	532
Fine[c]	373	--	--	373
Total	905	--	--	905
Hardwoods				
Coarse	6,027	--	117	6,144
Fine	4,392	--	96	4,488
Total	10,419	--	213	10,632
All species				
Coarse	6,559	--	117	6,676
Fine	4,765	--	96	4,861
Total	11,324	--	213	11,537

[a]Source of data: Bones and Sherwood 1979.

[b]Includes slabs, edgings, trimmings, veneer cores, and other material suitable for chipping.

[c]Includes sawdust, shavings, and other material considered unsuitable for chipping.

Table 31.--Number of growing-stock trees on commercial forest land, by species and diameter class, Western Unit, Pennsylvania, 1978.

(In thousands of trees)

Species	Diameter class (inches at breast height)										All classes
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
White and red pines	2,369	1,804	1,579	363	134	27	--	--	13	--	6,289
Other yellow pines	7,527	2,857	1,548	183	--	39	--	--	--	--	12,154
Hemlock	3,099	1,923	852	616	117	105	84	59	14	--	6,869
Other softwoods	837	137	93	264	72	--	--	--	--	--	1,403
Total softwoods	13,832	6,721	4,072	1,426	323	171	84	59	27	--	26,715
Select white oaks[a]	2,100	2,438	2,040	2,085	912	706	343	241	376	171	11,412
Northern red oak	3,889	5,473	3,701	2,650	1,370	1,006	711	370	342	85	19,597
Other oaks	2,611	1,079	1,451	669	550	574	452	324	276	50	8,036
Chestnut oak	708	911	130	190	1	68	59	--	42	12	2,121
Hickory	1,871	2,319	1,862	779	630	246	240	44	122	22	8,135
Yellow birch	834	281	334	114	83	--	--	--	--	--	1,646
Sweet birch	4,820	760	199	235	124	30	29	--	28	--	6,225
Sugar maple	7,536	4,511	3,197	2,347	1,291	739	491	239	260	30	20,641
Red maple	12,357	6,814	5,152	2,925	1,654	789	628	344	289	9	30,961
Beech	1,788	953	1,706	623	431	347	263	150	255	53	6,569
Blackgum	926	--	159	371	--	90	--	--	31	--	1,577
White ash	7,473	2,527	1,716	967	727	622	365	19	74	12	14,502
Aspen	7,296	3,416	1,597	340	267	68	--	--	--	--	12,984
Basswood	2,043	1,230	618	61	1	136	117	69	36	--	4,311
Yellow-poplar	2,874	1,482	1,333	1,149	1,134	486	337	215	549	22	9,581
Black walnut	3,461	1,480	738	235	45	232	--	34	46	--	6,271
Black cherry	12,760	11,497	8,494	4,838	1,564	1,042	503	198	208	12	41,116
Black locust	1,205	2,848	786	314	--	36	62	--	22	--	5,273
Other hardwoods	2,729	3,429	1,972	1,069	703	615	220	69	147	--	10,953
Total hardwoods	79,281	53,448	37,185	21,961	11,487	7,832	4,820	2,316	3,103	478	221,911
Total, all species	93,113	60,169	41,257	23,387	11,810	8,003	4,904	2,375	3,130	478	248,626

[a]Includes white and swamp oaks.
[b]Includes scarlet, shingle, pin, and black oaks.

Table 32 .--Net volume of growing stock on commercial forest land, by species and diameter class, Western Unit, Pennsylvania, 1978.

(In millions of cubic feet)

Species	Diameter class (inches at breast height)										All classes
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
White and red pines	13.8	15.0	18.6	5.3	2.4	0.7	--	--	0.5	--	56.3
Other yellow pines	13.2	11.3	14.4	3.2	--	1.6	--	--	--	--	43.7
Hemlock	10.7	9.5	6.4	7.0	1.9	2.1	2.3	2.3	0.9	--	43.1
Other softwoods	1.5	0.5	0.7	3.1	1.1	--	--	--	--	--	6.9
Total softwoods	39.2	36.3	40.1	18.6	5.4	4.4	2.3	2.3	1.4	--	150.0
Select white oaks[a]	4.9	12.2	20.2	30.3	21.8	21.2	13.9	11.1	20.2	15.1	170.9
Northern red oak	12.7	31.5	32.4	36.0	26.8	25.7	23.3	15.2	19.0	7.9	230.5
Other oaks[b]	9.2	5.8	12.9	9.4	10.7	14.7	14.4	13.6	14.3	4.2	109.2
Chestnut oak	2.1	4.8	1.5	2.7	W	2.1	2.3	--	1.9	1.1	18.5
Hickory	6.2	12.7	20.2	12.4	13.7	7.0	8.9	2.0	7.0	1.0	91.1
Yellow birch	2.2	1.2	2.4	1.4	1.4	--	--	--	--	--	8.6
Sweet birch	13.6	3.8	1.7	2.7	1.9	0.5	0.8	--	0.9	--	25.9
Sugar maple	26.5	25.9	30.4	33.8	27.9	20.9	18.6	11.1	15.5	3.0	213.6
Red maple	37.1	38.1	46.6	40.8	32.6	21.7	21.7	14.3	13.7	0.7	267.3
Beech	6.0	5.8	14.2	8.2	7.9	8.3	9.0	6.1	10.7	3.4	79.6
Blackgum	3.1	--	1.5	4.9	--	2.1	--	--	1.4	--	13.0
White ash	21.3	14.0	14.4	13.1	14.1	15.4	11.4	0.9	3.4	0.5	108.5
Aspen	19.6	17.0	13.5	4.9	5.0	1.9	--	--	--	--	61.9
Basswood	7.9	6.8	6.5	0.9	W	4.9	4.8	3.9	1.9	--	37.6
Yellow-poplar	9.1	8.1	11.3	14.4	22.3	12.5	11.2	9.2	26.2	1.7	126.0
Black walnut	6.9	5.3	5.1	3.1	1.1	5.3	--	1.1	1.3	--	29.2
Black cherry	35.2	57.5	77.7	67.8	31.3	29.6	18.4	8.2	12.6	1.2	339.5
Black locust	2.0	12.2	6.1	3.5	--	1.0	1.8	--	0.4	--	27.0
Other hardwoods	4.7	13.2	13.7	12.3	13.7	14.6	7.8	3.2	6.7	--	89.9
Total hardwoods	230.3	275.9	332.3	302.6	232.2	209.4	168.3	99.9	157.1	39.8	2,047.8
Total, all species	269.5	312.2	372.4	321.2	237.6	213.8	170.6	102.2	158.5	39.8	2,197.8

[a] Includes white and swamp white oaks.
[b] Includes scarlet, shingle, pin, and black oaks.
W-Less than 50,000 cubic feet.

Table 33.--Net volume of sawtimber on commercial forest land, by species and diameter class, Western Unit, Pennsylvania, 1978.

(In millions of board feet)[a]

Species	Diameter class (inches at breast height)								All classes
	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
White and red pines	59.3	19.5	9.0	3.0	--	--	2.5	--	93.3
Other yellow pines	45.0	11.0	--	6.6	--	--	--	--	62.6
Hemlock	19.9	24.7	7.0	9.0	9.2	9.9	4.3	--	84.0
Other softwoods	1.8	13.5	5.4	--	--	--	--	--	20.7
Total softwoods	126.0	68.7	21.4	18.6	9.2	9.9	6.8	--	260.6
Select white oaks[b]	--	111.3	89.8	93.9	66.1	54.1	104.6	97.6	617.4
Northern red oak	--	135.3	113.0	116.9	110.7	74.1	97.4	45.8	693.2
Other oaks[c]	--	36.5	45.5	66.3	68.5	64.7	71.8	25.9	379.2
Chestnut oak	--	10.0	0.1	9.1	10.1	--	11.6	6.8	47.7
Hickory	--	49.1	60.3	33.1	43.6	9.6	36.4	9.3	241.4
Yellow birch	--	5.5	6.1	--	--	--	--	--	11.6
Sweet birch	--	10.4	8.3	2.7	3.6	--	6.6	--	31.6
Sugar maple	--	129.7	121.1	94.4	88.2	54.0	88.7	19.3	595.4
Red maple	--	150.6	139.7	97.2	100.2	68.0	77.8	3.7	637.2
Beech	--	31.1	33.8	37.9	44.2	29.9	68.2	22.6	267.7
Blackgum	--	19.0	--	10.1	--	--	8.9	--	38.0
White ash	--	50.0	60.1	70.8	58.9	4.5	19.8	5.9	270.0
Aspen	--	18.1	20.9	8.6	--	--	--	--	47.6
Basswood	--	3.5	0.2	22.1	22.0	18.2	11.0	--	77.0
Yellow-poplar	--	57.0	96.3	59.1	55.4	44.4	138.2	8.4	458.8
Black walnut	--	12.9	4.4	27.9	--	6.8	10.8	--	62.8
Black cherry	--	252.1	130.5	130.8	84.8	39.1	62.8	5.9	706.0
Black locust	--	14.9	--	4.3	9.1	--	5.3	--	33.6
Other hardwoods	--	52.7	60.7	70.8	38.6	14.5	37.1	--	274.4
Total hardwoods	--	1,149.7	990.8	956.0	804.0	481.9	857.0	251.2	5,490.6
Total, all species	126.0	1,218.4	1,012.2	974.6	813.2	491.8	863.8	251.2	5,751.2

[a] International 1/4-inch rule.
[b] Includes white and swamp white oaks.
[c] Includes scarlet, shingle, pin, and black oaks.

Table 34.--Net volume of sawtimber on commercial forest land, by species and standard-lumber log grade, Western Unit, Pennsylvania, 1978.
(In millions of board feet)[a]

Species	Grade 1	Grade 2	Grade 3	Grade 4[b]	All classes
White and red pines	--	2.3	86.2	4.8	93.3
Yellow pines	--	--	62.6	--	62.6
Other softwoods[c]	--	--	--	--	104.7
Total softwoods	--	2.3	148.8	4.8	260.6
Select white oaks[d]	90.2	101.5	294.3	131.4	617.4
Northern red oak	201.2	157.0	268.8	66.2	693.2
Other oaks[e]	97.8	74.3	134.4	72.7	379.2
Chestnut oak	23.7	4.2	17.2	2.6	47.7
Hickory	39.6	47.1	103.1	51.6	241.4
Yellow birch	0.1	4.6	6.3	0.6	11.6
Sweet birch	1.4	7.1	21.3	1.8	31.6
Sugar maple	95.2	142.1	282.7	75.4	595.4
Red maple	40.3	99.0	385.4	112.5	637.2
Beech	40.2	44.1	143.2	40.2	267.7
Blackgum	3.1	5.6	25.1	4.2	38.0
White ash	43.4	76.6	113.5	36.5	270.0
Aspen	2.7	9.0	28.6	7.3	47.6
Basswood	16.9	17.9	37.9	4.3	77.0
Yellow-poplar	67.6	110.5	173.9	106.8	458.8
Black walnut	11.3	7.6	33.5	10.4	62.8
Black cherry	88.5	108.5	411.0	98.0	706.0
Black locust	2.7	0.9	26.0	4.0	33.6
Other hardwoods	54.5	57.0	133.8	29.1	274.4
Total hardwoods	920.4	1,074.6	2,640.0	855.6	5,490.6
Hardwood quality (in percent)	17	19	48	16	100
Hardwood sampling error (in percent)	8	6	5	6	3.9

[a] International 1/4-inch rule.
[b] Grade 4 applies only to white pine. For hardwoods the volumes in this column are for construction logs.
[c] Species other than pine are not graded into standard-lumber grades.
[d] Includes white and swamp white oaks.
[e] Includes scarlet, shingle, pin, and black oaks.

Table 35.--Sampling errors for major number of trees and timber-volume classes, Western Unit, Pennsylvania, 1978.

(In percent)

Species	Number of trees (Table 31)	Growing-stock volume (Table 32)	Sawtimber volume (Table 33)
White and red pines	62	58	65
Other yellow pines	34	33	46
Hemlock	55	46	42
Other softwoods	60	70	92
Select white oaks	20	16	16
Northern red oak	20	16	15
Other oaks	25	17	17
Chestnut oak	34	25	35
Hickory	22	21	26
Yellow birch	40	32	62
Sweet birch	48	39	34
Sugar maple	14	13	15
Red maples	13	11	13
Beech	30	19	18
Blackgum	33	28	35
White ash	18	15	16
Aspen	27	23	40
Basswood	39	32	46
Yellow-poplar	28	29	32
Black walnut	41	30	44
Black cherry	12	11	16
Black locust	39	35	53
Other hardwoods	26	19	22
Dbh classes (inches)			
5.0 to 6.9	9	8	--
7.0 to 8.9	8	7	--
9.0 to 10.9	7	6	41
11.0 to 12.9	8	7	8
13.0 to 14.9	8	7	7
15.0 to 16.9	10	9	8
17.0 to 18.9	10	9	8
19.0 to 20.9	13	12	11
21.0 to 28.9	14	13	10
29.0 +	20	20	19

Table 36.--Number of growing-stock trees on commercial forest land, by species and diameter class
Southwestern Unit, Pennsylvania, 1978.

(In thousands of trees)

Species	Diameter class (inches at breast height)										All classes
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
White and red pines	318	462	688	169	49	72	53	21	15	--	1,847
Virginia pine	346	113	147	61	W	--	--	19	--	--	686
Other yellow pines	443	17	87	9	6	21	--	--	--	--	583
Hemlock	1,913	1,531	945	731	290	178	53	39	17	--	5,697
Other softwoods	4	130	--	--	--	--	--	--	--	--	134
Total softwoods	3,024	2,253	1,867	970	345	271	106	79	32	--	8,947
White oak	3,926	3,307	2,523	901	483	185	136	26	116	--	11,603
Northern red oak	7,284	6,662	5,026	3,847	2,085	1,614	617	511	540	46	28,232
Other oaks[a]	1,783	3,122	1,929	681	992	166	268	108	208	14	9,271
Chestnut oak	10,748	9,523	5,664	3,079	1,373	818	404	185	79	--	31,873
Hickory	2,227	2,096	817	340	416	182	44	--	9	--	6,131
Yellow birch	45	235	234	4	W	--	--	--	W	--	518
Sweet birch	3,746	2,079	500	473	56	37	24	--	13	--	6,928
Sugar maple	5,902	4,285	2,060	1,231	775	471	174	168	70	9	15,145
Red maple	12,117	6,500	4,367	3,238	1,048	271	190	136	113	--	27,980
Beech	516	1,516	609	567	413	61	98	60	29	8	3,877
Blackgum	461	286	287	63	42	--	2	--	--	--	1,141
White ash	2,934	780	756	234	171	142	71	57	27	8	5,180
Aspen	789	175	112	120	44	27	--	--	--	--	1,267
Basswood	2,002	252	309	187	112	65	26	39	--	--	2,992
Yellow-poplar	1,009	709	664	382	276	146	59	74	61	--	3,380
Black walnut	--	--	--	--	--	5	--	--	--	--	5
Black cherry	6,996	4,011	2,046	1,802	1,417	460	355	172	111	--	17,370
Black locust	2,476	1,963	1,194	336	132	154	44	--	33	--	6,332
Other hardwoods	744	720	918	219	91	382	26	77	88	14	3,279
Total hardwoods	65,705	48,221	30,015	17,704	9,926	5,186	2,538	1,613	1,497	99	182,504
Total, all species	68,729	50,474	31,882	18,674	10,271	5,457	2,644	1,692	1,529	99	191,451

[a]Includes scarlet and black oaks.
W-Less than 500 trees.

Table 37.--Net volume of growing stock on commercial forest land, by species and diameter class, Southwestern Unit, Pennsylvania, 1978.

(In millions of cubic feet)

Species	Diameter class (inches at breast height)										All classes
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
White and red pines	1.4	3.2	6.7	2.6	1.0	2.1	1.9	1.2	1.2	--	21.3
Virginia pine	0.9	0.6	1.3	0.7	W	--	--	0.7	--	--	4.2
Other yellow pines	0.9	0.1	0.7	0.1	0.2	1.0	--	--	--	--	3.0
Hemlock	8.3	9.2	8.3	9.7	5.7	5.2	2.0	2.3	1.2	--	51.9
Other softwoods	W	0.5	--	--	--	--	--	--	--	--	0.5
Total softwoods	11.5	13.6	17.0	13.1	6.9	8.3	3.9	4.2	2.4	--	80.9
White oak	9.6	20.3	28.4	17.6	13.1	7.3	6.3	1.2	8.1	--	111.9
Northern red oak	27.1	44.0	56.5	67.9	50.7	52.2	26.2	25.4	36.4	5.2	391.6
Other oaks[a]	6.2	18.6	19.9	11.6	23.2	5.3	11.0	5.4	12.8	1.7	115.7
Chestnut oak	38.0	58.9	58.5	49.2	30.7	24.0	15.1	8.0	4.1	--	286.5
Hickory	8.0	15.8	10.1	7.1	10.5	6.8	2.1	--	0.8	--	61.2
Yellow birch	0.2	1.8	2.5	0.1	W	--	--	--	W	--	4.6
Sweet birch	14.0	12.9	5.1	6.9	1.3	1.0	0.9	--	0.6	--	42.7
Sugar maple	23.6	26.4	22.0	19.3	16.1	13.4	6.4	8.4	5.3	1.0	141.9
Red maple	43.5	43.9	47.8	53.4	25.1	8.4	7.1	6.2	6.0	--	241.4
Beech	1.9	8.9	6.3	9.2	9.0	2.1	3.7	2.7	1.5	0.7	46.0
Blackgum	1.7	1.8	2.6	1.0	0.9	--	0.1	--	--	--	8.1
White ash	10.1	4.5	7.2	3.5	3.6	4.1	3.0	3.1	2.1	2.0	43.2
Aspen	2.5	0.9	1.1	2.3	0.9	0.9	--	--	--	--	8.6
Basswood	7.1	2.4	3.5	3.6	3.3	2.3	1.2	2.1	--	--	25.5
Yellow-poplar	4.1	5.4	8.5	6.8	7.2	5.1	2.3	4.3	3.8	--	47.5
Black walnut	--	--	--	--	--	0.1	--	--	--	--	0.1
Black cherry	24.8	24.8	21.4	28.7	31.3	13.4	12.8	7.2	5.8	--	170.2
Black locust	5.7	11.7	12.7	6.0	3.7	6.0	1.9	--	1.7	--	49.4
Other hardwoods	1.5	4.5	10.3	4.1	2.2	13.7	1.2	4.6	6.2	1.3	49.6
Total hardwoods	229.6	307.5	324.4	298.3	232.8	166.1	101.3	78.6	95.2	11.9	1,845.7
Total, all species	241.1	321.1	341.4	311.4	239.7	174.4	105.2	82.8	97.6	11.9	1,926.6

[a]Includes scarlet and black oaks.
W-Less than 50,000 cubic feet.

Table 38.--Net volume of sawtimber on commercial forest land, by species and diameter class, Southwestern Unit, Pennsylvania, 1978.

(In millions of board feet)[a]

Species	Diameter class (inches at breast height)								All classes
	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
White and red pines	23.7	11.7	4.2	9.0	9.5	6.8	5.2	--	70.1
Virginia pine	4.5	3.4	W	--	--	3.5	--	--	11.4
Other yellow pines	2.5	0.7	0.9	5.1	--	--	--	--	9.2
Hemlock	27.5	37.2	23.5	21.2	9.4	9.7	5.8	--	134.3
Total softwoods	58.2	53.0	28.6	35.3	18.9	20.0	11.0	--	225.0
White oak	--	71.8	59.2	34.0	30.6	6.3	48.7	--	250.6
Northern red oak	--	274.6	224.2	243.8	127.5	134.3	205.6	31.6	1,241.6
Other oaks[b]	--	49.5	109.0	25.5	57.7	28.1	75.7	10.0	355.5
Chestnut oak	--	202.5	138.0	115.4	75.5	42.5	23.5	--	597.4
Hickory	--	28.8	48.6	33.8	10.5	--	4.8	--	126.5
Yellow birch	--	0.3	W	--	--	--	W	--	0.3
Sweet birch	--	26.8	5.2	4.3	4.8	--	3.8	--	44.9
Sugar maple	--	78.7	72.9	64.9	33.8	46.8	32.7	6.0	335.8
Red maple	--	209.3	111.5	38.5	36.5	31.3	37.6	--	464.7
Beech	--	33.7	38.1	8.4	18.0	13.1	7.8	4.0	123.1
Blackgum	--	4.1	4.0	--	0.5	--	--	--	8.6
White ash	--	13.8	16.0	19.3	15.1	15.8	12.4	11.7	104.1
Aspen	--	9.0	3.7	3.9	--	--	--	--	16.6
Basswood	--	15.3	15.4	11.7	6.3	10.6	--	--	59.3
Yellow-poplar	--	26.0	30.1	23.6	11.7	22.1	20.6	--	134.1
Black walnut	--	--	--	0.8	--	--	--	--	0.8
Black cherry	--	115.3	131.5	59.2	62.9	37.2	30.7	--	436.8
Black locust	--	24.6	16.4	28.2	10.3	--	10.1	--	89.6
Other hardwoods	--	15.6	10.2	61.5	5.8	23.0	33.9	8.8	158.8
Total hardwoods	--	1,199.7	1,034.0	776.8	507.5	411.1	547.9	72.1	4,549.1
Total, all species	58.2	1,252.7	1,062.6	812.1	526.4	431.1	558.9	72.1	4,774.1

[a] International 1/4-inch rule.
[b] Includes scarlet and black oaks.
W-Less than 50,000 board feet.

Table 39.--Net volume of sawtimber on commercial forest land, by species and standard-lumber log grade, Southwestern Unit, Pennsylvania, 1978.

(In millions of board feet)[a]

Species	Grade 1	Grade 2	Grade 3	Grade 4[b]	All classes
White and red pines	7.7	15.0	27.6	19.8	70.1
Yellow pines	2.0	6.6	12.0	--	20.6
Other softwoods[c]	--	--	--	--	134.3
Total	9.7	21.6	39.6	19.8	225.0
White oak	28.2	34.8	122.4	65.2	250.6
Northern red oak	312.1	300.8	519.5	109.2	1,241.6
Other oaks[d]	65.3	67.0	134.9	88.3	355.5
Chestnut oak	50.0	154.2	309.9	83.3	597.4
Hickory	4.7	27.1	64.9	29.8	126.5
Yellow birch	--	--	0.2	0.1	0.3
Sweet birch	3.5	6.5	26.1	8.8	44.9
Sugar maple	62.1	65.4	157.1	51.2	335.8
Red maple	32.2	75.8	278.5	78.2	464.7
Beech	17.3	14.1	47.8	43.9	123.1
Blackgum	--	--	7.4	1.2	8.6
White ash	29.8	35.8	30.5	8.0	104.1
Aspen	W	W	7.0	9.6	16.6
Basswood	3.4	9.5	42.5	3.9	59.3
Yellow-poplar	29.0	24.5	48.8	31.8	134.1
Black walnut	0.5	0.3	--	--	0.8
Black cherry	29.0	62.2	268.2	77.4	436.8
Black locust	3.0	23.5	53.2	9.9	89.6
Other hardwoods	35.0	50.4	53.2	20.2	158.8
Total hardwoods	705.1	951.9	2,172.1	720.0	4,549.1
Hardwood quality (in percent)	15	21	48	16	100
Hardwood sampling error (in percent)	9	6	5	7	4.4

[a] International 1/4-inch rule.

[b] Grade 4 applies only to white pine. For hardwoods the volumes in this column are for construction logs.

[c] Species other than pine are not graded into standard-lumber grades.

[d] Includes scarlet and black oaks.

W-Less than 50,000 board feet.

Table 40.--Sampling errors for major number of trees and timber-volume classes, Southwestern Unit, Pennsylvania, 1978.

(In percent)

Species	Number of trees (Table 36)	Growing-stock volume (Table 37)	Sawtimber volume Table 38)
White and red pines	52	45	49
Virginia pine	59	50	52
Other yellow pines	56	41	50
Hemlock	31	27	34
Other softwoods	96	95	--
Select white oaks	19	16	19
Northern red oak	14	10	11
Other oaks	17	13	15
Chestnut oak	15	14	20
Hickory	26	22	26
Yellow birch	42	43	47
Sweet birch	17	16	30
Sugar maple	17	17	24
Red maples	12	11	16
Beech	34	33	36
Blackgum	43	40	67
White ash	28	24	35
Aspen	66	48	48
Basswood	48	34	42
Yellow-poplar	38	28	30
Black walnut	100	99	96
Black cherry	16	14	18
Black locust	25	26	35
Other hardwoods	25	26	34
Dbh classes (inches)			
5.0 to 6.9	10	10	--
7.0 to 8.9	8	7	--
9.0 to 10.9	7	6	42
11.0 to 12.9	8	6	8
13.0 to 14.9	8	7	7
15.0 to 16.9	11	10	9
17.0 to 18.9	12	11	11
19.0 to 20.9	13	13	11
21.0 to 28.9	15	14	13
29.0+	35	35	33

Table 41.--Number of growing-stock trees on commercial forest land, by species and diameter class, Allegheny Unit, Pennsylvania, 1978.

(In thousands of trees)

Species	Diameter class (inches at breast height)										All classes
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
White and red pines	3,168	2,043	1,036	446	107	267	121	51	202	--	7,441
Other yellow pines	11	255	11	134	40	9	--	--	--	--	460
Hemlock	16,955	7,726	2,317	2,048	1,257	852	331	390	206	8	32,090
Other softwoods	498	556	232	--	--	--	--	--	--	--	1,286
Total softwoods	20,632	10,580	3,596	2,628	1,404	1,128	452	441	408	8	41,277
White oak	4,140	3,393	2,651	1,621	687	296	146	119	73	--	13,126
Northern red oak	2,746	2,606	3,386	3,120	2,906	1,543	1,391	695	682	53	19,128
Other oaks[a]	1,112	2,143	1,322	1,484	1,045	363	408	43	77	--	7,997
Chestnut oak	5,409	4,767	3,918	1,377	697	484	306	41	113	--	17,112
Hickory	2,268	2,824	1,173	970	218	153	48	--	17	--	7,671
Yellow birch	5,439	2,968	1,781	692	317	64	76	2	46	--	11,385
Sweet birch	15,460	9,187	4,703	1,267	361	325	93	20	16	--	31,432
Sugar maple	36,974	31,887	15,077	7,859	4,670	1,934	850	280	282	73	99,886
Red maples[b]	45,954	38,082	23,600	11,329	6,191	1,856	1,059	372	267	22	128,732
Beech	18,246	11,060	6,321	3,446	2,159	1,211	658	416	210	--	43,727
Blackgum	61	139	81	--	--	--	--	--	--	--	281
White ash	2,542	2,889	4,181	3,086	1,309	887	370	406	52	--	15,722
Aspen	9,129	7,658	5,440	2,041	676	240	52	18	--	--	25,254
Basswood	1,289	2,287	1,236	625	598	325	37	75	36	--	6,508
Yellow-poplar	50	290	668	467	479	292	105	68	46	--	2,465
Black walnut	--	--	103	178	135	67	--	22	38	--	543
Black cherry	13,573	12,832	12,806	8,349	5,409	3,335	1,796	849	682	35	59,666
Black locust	--	W	53	W	--	--	--	--	--	--	53
Other hardwoods	3,230	2,353	1,565	707	495	102	72	60	58	--	8,642
Total hardwoods	167,622	137,365	90,065	48,618	28,352	13,477	7,467	3,486	2,695	183	499,330
Total, all species	188,254	147,945	93,661	51,246	29,756	14,605	7,919	3,927	3,103	191	540,607

[a] Includes scarlet and black oaks.
[b] Includes 955,000 silver maple trees.
W-Less than 500 trees.

Table 42 .--Net volume of growing stock on commercial forest land, by species and diameter class, Allegheny Unit, Pennsylvania, 1978.

(In millions of cubic feet)

Species	Diameter class (inches at breast height)										All classes
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
White and red pines	15.3	14.1	11.1	6.6	2.5	8.9	5.4	2.1	12.9	--	78.9
Other yellow pines	W	1.0	0.1	1.7	1.0	0.2	--	--	--	--	4.0
Hemlock	59.8	44.6	22.0	30.3	27.5	25.0	13.4	19.2	16.4	1.1	259.3
Other softwoods	1.0	3.7	2.4	--	--	--	--	--	--	--	7.1
Total softwoods	76.1	63.4	35.6	38.6	31.0	34.1	18.8	21.3	29.3	1.1	349.3
White oak	13.4	21.8	31.5	30.6	17.7	10.3	6.4	6.8	6.3	--	144.8
Northern red oak	9.3	17.6	41.5	59.4	80.0	58.1	68.4	42.9	55.9	7.0	440.1
Other oaks[a]	4.4	14.0	15.9	25.1	27.7	11.8	19.0	2.9	5.0	--	125.8
Chestnut oak	17.5	29.7	39.1	21.9	15.5	13.2	10.8	1.9	4.6	--	154.2
Hickory	9.4	20.6	13.4	17.9	5.2	4.8	2.3	--	1.1	--	74.7
Yellow birch	20.0	20.4	18.6	11.2	7.4	2.1	2.5	0.1	2.5	--	84.8
Sweet birch	57.5	66.6	53.7	21.8	7.9	9.5	3.7	0.7	0.8	--	222.2
Sugar maple	166.3	258.1	201.6	161.8	131.6	70.6	40.2	16.1	21.7	11.4	1,079.4
Red maples[b]	177.5	298.0	307.0	227.7	175.6	71.2	50.6	22.2	18.7	4.1	1,352.6
Beech	71.6	85.4	76.2	62.7	57.2	43.5	28.9	22.9	16.3	--	464.7
Blackgum	0.1	1.1	1.0	--	--	--	--	--	--	--	2.2
White ash	8.4	23.9	55.8	62.3	37.1	32.5	18.7	25.8	3.5	--	268.0
Aspen	30.8	54.5	67.0	40.6	18.6	9.3	2.5	0.9	--	--	224.2
Basswood	6.3	20.9	20.3	15.2	20.3	15.3	2.1	5.7	2.6	--	108.7
Yellow-poplar	0.2	1.9	8.9	10.5	14.8	12.1	5.4	5.0	3.2	--	62.0
Black walnut	--	--	0.8	2.8	3.3	2.4	--	1.3	2.0	--	12.6
Black cherry	52.1	92.9	164.0	174.8	158.7	135.0	92.9	57.1	69.0	4.3	1,000.8
Black locust	--	W	0.5	W	--	--	--	--	--	--	0.5
Other hardwoods	10.2	14.0	17.7	12.8	14.3	3.7	3.1	3.4	3.6	--	82.8
Total hardwoods	655.0	1,041.4	1,134.5	959.1	792.9	505.4	357.5	215.7	216.8	26.8	5,905.1
Total, all species	731.1	1,104.8	1,170.1	997.7	823.9	539.5	376.3	237.0	246.1	27.9	6,254.4

[a] Includes scarlet and black oaks.
[b] Includes 14.0 million cubic feet of silver maple.
W-Less than 50,000 cubic feet.

Table 45.--Net volume of sawtimber on commercial forest land, by species and diameter class, Allegheny Unit, Pennsylvania, 1978.

(In millions of board feet)[a]

Species	Diameter class (inches at breast height)								All classes
	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
White and red pines	39.1	24.5	11.3	37.6	24.3	5.7	56.4	--	198.9
Other yellow pines	0.4	5.7	4.5	1.2	--	--	--	--	11.8
Hemlock	69.3	104.0	107.7	101.4	59.5	73.3	75.0	4.6	594.8
Other softwoods	8.2	--	--	--	--	--	--	--	8.2
Total softwoods	117.0	134.2	123.5	140.2	83.8	79.0	131.4	4.6	813.7
White oak	--	112.0	70.9	44.3	31.2	30.9	32.0	--	321.3
Northern red oak	--	226.3	334.9	256.3	308.5	194.4	262.9	33.2	1,616.5
Other oaks[b]	--	112.1	112.6	50.1	81.3	15.3	25.2	--	396.6
Chestnut oak	--	95.2	62.6	61.8	52.2	9.5	23.9	--	305.2
Hickory	--	69.6	23.9	22.1	11.0	--	4.7	--	131.3
Yellow birch	--	35.9	23.6	8.7	10.8	0.5	4.5	--	84.0
Sweet birch	--	69.8	32.1	41.9	7.6	3.3	4.2	--	158.9
Sugar maple	--	576.3	519.9	305.8	158.4	74.9	96.4	48.5	1,780.2
Red maples[c]	--	730.9	643.9	290.7	220.2	103.8	91.8	20.9	2,102.2
Beech	--	217.5	224.9	187.9	115.3	92.8	67.0	--	905.4
White ash	--	219.3	150.1	136.0	88.4	122.9	15.9	--	732.6
Aspen	--	149.1	77.3	40.0	11.5	4.9	--	--	282.8
Basswood	--	58.7	93.9	67.8	8.7	25.9	12.4	--	267.4
Yellow-poplar	--	34.6	64.2	52.6	24.7	33.1	16.4	--	225.6
Black walnut	--	9.0	14.2	11.0	--	6.2	11.1	--	51.5
Black cherry	--	575.8	605.6	552.5	383.6	250.3	296.0	23.9	2,687.7
Black locust	--	W	--	--	--	--	--	--	W
Other hardwoods	--	43.9	54.2	16.5	15.5	17.3	20.2	--	167.6
Total hardwoods	--	3,336.0	3,108.8	2,146.0	1,528.9	986.0	984.6	126.5	12,216.8
Total, all species	117.0	3,470.2	3,232.3	2,286.2	1,612.7	1,065.0	1,116.0	131.1	13,030.5

[a] International 1/4-inch rule.
[b] Includes scarlet and black oaks.
[c] Includes 38.1 million board feet of silver maple.
W-Less than 50,000 board feet.

Table 44 .--Net volume of sawtimber on commercial forest land, by species and standard-lumber log grade, Allegheny Unit, Pennsylvania, 1978.

(In millions of board feet)[a]

Species	Grade 1	Grade 2	Grade 3	Grade 4[b]	All classes
White and red pines	5.7	48.5	88.8	55.9	198.9
Yellow pines	0.7	3.1	8.0	--	11.8
Other softwoods[c]	--	--	--	--	603.0
Total softwoods	6.4	51.6	96.8	55.9	813.7
White oak	48.0	73.3	146.8	53.2	321.3
Northern red oak	489.1	406.3	534.3	186.8	1,616.5
Other oaks[d]	32.6	74.3	172.6	117.1	396.6
Chestnut oak	36.7	64.3	152.4	51.8	305.2
Hickory	5.0	36.7	63.0	26.6	131.3
Yellow birch	2.8	17.3	53.6	10.3	84.0
Sweet birch	9.1	29.2	84.5	36.1	158.9
Sugar maple	249.9	378.9	884.7	266.7	1,780.2
Red maples[e]	104.3	386.3	1,312.3	299.3	2,102.2
Beech	42.3	169.0	477.7	216.4	905.4
White ash	179.1	171.7	310.8	71.0	732.6
Aspen	6.3	43.3	169.2	64.0	282.8
Basswood	39.0	48.8	147.8	31.8	267.4
Yellow-poplar	59.0	63.9	77.2	25.5	225.6
Black walnut	3.9	1.3	42.0	4.3	51.5
Black cherry	442.8	744.5	1,254.4	246.0	2,687.7
Black locust	--	--	W	--	W
Other hardwoods	21.1	31.7	101.4	13.4	167.6
Total hardwoods	1,771.0	2,740.8	5,984.7	1,720.3	12,216.8
Hardwood quality (in percent)	15	22	49	14	100
Hardwood sampling error (in percent)	6	4	3	5	2.2

[a] International 1/4-inch rule

[b] Grade 4 applies only to white pine. For hardwoods the volumes in this column are for construction logs.

[c] Species other than pine are not graded into standard-lumber grades.

[d] Includes scarlet and black oaks.

[e] Includes 38.1 million board feet of silver maple.

W Less than 50,000 board feet.

Table 45.--Sampling errors for major number of trees and timber-volume classes, Allegheny Unit, Pennsylvania, 1978.

(In percent)

Species	Number of trees (Table 41)	Growing-stock volume (Table 42)	Sawtimber volume (Table 43)
White and red pines	45	36	30
Other yellow pines	46	48	59
Hemlock	19	15	17
Other softwoods	59	57	78
Select white oaks	19	16	19
Northern red oak	12	12	12
Other oaks	21	23	22
Chestnut oak	17	20	24
Hickory	26	25	26
Yellow birch	15	14	24
Sweet birch	15	14	21
Sugar maple	9	8	11
Red maples	9	8	11
Beech	13	11	14
Blackgum	54	61	--
White ash	16	14	14
Aspen	18	17	23
Basswood	18	17	19
Yellow-poplar	29	29	30
Black walnut	71	78	85
Black cherry	15	10	11
Black locust	86	82	64
Other hardwoods	34	25	40
Dbh classes (inches)			
5.0 to 6.9	5	5	--
7.0 to 8.9	5	4	--
9.0 to 10.9	4	4	33
11.0 to 12.9	4	4	5
13.0 to 14.9	5	5	4
15.0 to 16.9	7	6	5
17.0 to 18.9	8	8	7
19.0 to 20.9	10	10	9
21.0 to 28.9	10	10	8
29.0 +	40	38	37

Table 46.--Number of growing-stock trees on commercial forest land, by species and diameter class, North-Central Unit, Pennsylvania, 1978.

(In thousands of trees)

Species	Diameter class (inches at breast height)										All classes
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
White and red pines	6,993	3,373	2,508	942	504	367	466	139	281	35	15,608
Virginia pine	773	144	64	62	W	--	--	--	--	--	1,043
Other yellow pines	3,121	445	798	594	213	214	--	--	--	--	5,385
Hemlock	9,334	6,498	3,387	2,548	1,530	783	429	175	205	--	24,889
Other softwoods	974	280	--	--	--	--	--	--	--	--	1,254
Total softwoods	21,195	10,740	6,757	4,146	2,247	1,364	895	314	486	35	48,179
Select white oaks[a]	11,750	7,894	6,139	3,328	2,244	999	818	363	223	--	33,758
Northern red oak	8,728	5,887	6,451	5,819	3,433	2,169	1,380	761	668	96	35,392
Other oaks[b]	6,883	4,121	2,659	2,496	1,970	797	506	190	211	20	19,853
Chestnut oak	14,477	13,625	6,557	4,372	2,154	1,122	478	198	122	--	43,105
Hickory	1,275	1,359	996	1,331	406	152	147	--	34	--	5,700
Yellow birch	2,295	1,093	446	103	18	44	47	--	17	--	4,063
Sweet birch	10,836	6,364	2,937	1,073	697	372	30	37	--	--	22,346
Sugar maple	5,823	3,397	2,861	1,658	1,097	443	241	76	76	15	15,687
Red maple	40,083	19,369	10,289	4,807	1,804	954	607	165	144	17	78,239
Beech	1,990	872	884	594	551	287	162	114	105	7	5,566
Blackgum	1,731	168	107	W	99	74	3	--	30	--	2,212
White ash	2,074	2,015	1,342	827	546	251	262	39	32	11	7,399
Aspen	5,186	4,759	2,368	519	288	88	--	--	--	--	13,208
Basswood	640	969	1,133	1,049	304	203	--	20	--	--	4,318
Yellow-poplar	59	377	683	348	230	158	130	126	63	--	2,174
Black walnut	--	--	94	--	--	20	--	--	--	--	114
Black cherry	4,293	6,130	4,276	1,760	835	520	230	42	63	--	18,149
Black locust	972	1,242	501	118	161	--	27	--	16	--	3,037
Other hardwoods	597	388	583	228	628	111	54	--	--	--	2,589
Total hardwoods	119,692	80,029	51,306	30,430	17,465	8,764	5,122	2,131	1,804	166	316,909
Total, all species	140,887	90,769	58,063	34,576	19,712	10,128	6,017	2,445	2,290	201	365,088

[a] Includes white and bur oaks.
[b] Includes scarlet and black oaks.
W-Less than 500 trees.

Table 47 .--Net volume of growing stock on commercial forest land, by species and diameter class, North-Central Unit, Pennsylvania, 1978.

(In millions of cubic feet)

Species	Diameter class (inches at breast height)										All classes
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0-	
White and red pines	32.9	23.9	26.8	15.3	11.6	11.1	17.9	7.3	19.0	4.2	170.0
Virginia pine	0.8	0.4	0.7	0.7	W	--	--	--	--	--	2.6
Other yellow pines	3.7	2.0	6.6	8.7	5.1	8.7	--	--	--	--	34.8
Hemlock	33.4	37.8	30.9	34.9	31.4	21.2	16.3	8.7	13.4	--	228.0
Other softwoods	1.1	1.1	--	--	--	--	--	--	--	--	2.2
Total softwoods	71.9	65.2	65.0	59.6	48.1	41.0	34.2	16.0	32.4	4.2	437.6
Select white oaks[a]	35.7	49.4	64.1	57.0	52.2	33.6	33.8	19.1	15.8	--	360.7
Northern red oak	31.8	39.7	82.8	123.5	93.4	77.6	62.3	42.3	48.2	10.3	611.9
Other oaks[b]	24.2	27.1	30.1	42.3	43.6	25.8	22.5	10.6	12.9	2.5	241.6
Chestnut oak	47.2	84.8	67.6	66.8	46.3	31.1	17.1	9.1	6.6	--	376.6
Hickory	4.5	8.6	10.0	22.3	10.4	5.3	6.4	--	2.1	--	69.6
Yellow birch	8.5	7.1	4.6	1.7	0.5	1.2	1.5	--	1.0	--	26.1
Sweet birch	39.3	42.5	28.6	15.0	14.1	9.8	1.1	1.6	--	--	152.0
Sugar maple	25.4	28.2	36.2	31.3	28.8	15.7	10.8	3.9	5.8	1.7	187.8
Red maple	138.2	130.7	118.2	84.6	44.5	31.3	25.0	8.5	8.7	1.5	591.2
Beech	7.6	6.4	10.1	11.3	13.6	9.3	7.3	5.9	7.5	0.6	79.6
Blackgum	5.6	1.4	1.0	W	3.1	2.6	0.1	--	2.0	--	15.8
White ash	6.9	13.7	16.0	15.8	13.5	9.6	12.9	2.1	2.7	1.4	94.6
Aspen	17.2	29.0	28.8	10.1	8.0	3.2	--	--	--	--	96.3
Basswood	3.3	8.8	19.0	28.2	10.4	8.8	--	1.4	--	--	79.9
Yellow-poplar	0.2	2.7	9.3	7.5	6.0	5.4	5.5	7.1	3.9	--	47.6
Black walnut	--	--	0.9	--	--	0.6	--	--	--	--	1.5
Black cherry	16.1	38.5	49.2	31.5	21.2	17.5	9.9	2.3	6.4	--	192.6
Black locust	2.7	8.5	4.7	2.0	4.3	--	1.2	--	0.9	--	24.3
Other hardwoods	2.4	2.6	6.3	4.0	15.1	3.4	2.3	--	--	--	36.1
Total hardwoods	416.8	529.7	587.5	554.9	429.0	291.8	219.7	113.9	124.5	18.0	3,285.8
Total, all species	488.7	594.9	652.5	614.5	477.1	332.8	253.9	129.9	156.9	22.2	3,723.4

[a]Includes white and bur oaks.
[b]Includes scarlet and black oaks.
W-Less than 50,000 cubic feet.

Table 48 .--Net volume of sawtimber on commercial forest land, by species and diameter class, North-Central Unit, Pennsylvania, 1978.

(In millions of board feet)[a]

Species	Diameter class (inches at breast height)								All classes
	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
White and red pines	90.5	60.3	46.2	48.0	79.5	35.7	92.0	21.8	474.0
Virginia pine	2.2	2.6	W	--	--	--	--	--	4.8
Other yellow pines	21.3	31.9	21.7	40.4	--	--	--	--	115.3
Hemlock	95.9	124.6	118.9	86.6	66.0	35.3	58.5	--	585.8
Total softwoods	209.9	219.4	186.8	175.0	145.5	71.0	150.5	21.8	1,179.9
Select white oaks[b]	--	207.4	194.9	140.7	146.6	87.1	75.6	--	852.3
Northern red oak	--	469.6	388.8	326.6	262.1	196.0	229.2	47.6	1,919.9
Other oaks[c]	--	162.0	184.2	107.8	100.0	48.5	60.7	11.8	675.0
Chestnut oak	--	237.3	180.8	142.5	74.4	41.2	34.1	--	710.3
Hickory	--	78.5	39.8	22.3	26.9	--	9.2	--	176.7
Yellow birch	--	5.7	1.0	4.9	6.8	--	4.4	--	22.8
Sweet birch	--	54.3	59.1	42.6	3.6	7.4	--	--	167.0
Sugar maple	--	107.1	126.6	64.5	43.3	16.7	27.2	8.4	393.8
Red maples	--	298.0	167.8	127.2	103.2	36.8	41.2	6.7	780.9
Beech	--	39.4	51.9	38.6	31.3	25.3	34.6	2.7	223.8
Blackgum	--	W	14.7	12.5	0.7	--	8.7	--	36.6
White ash	--	54.8	52.1	39.5	69.5	8.7	12.7	6.6	243.9
Aspen	--	37.4	34.1	12.3	--	--	--	--	83.8
Basswood	--	96.2	42.4	38.7	--	5.3	--	--	182.6
Yellow-poplar	--	28.5	25.1	21.9	23.6	35.0	17.2	--	151.3
Black walnut	--	--	--	3.3	--	--	--	--	3.3
Black cherry	--	108.5	76.6	68.8	38.5	9.3	27.1	--	328.8
Black locust	--	6.9	16.8	--	4.7	--	4.6	--	33.0
Other hardwoods	--	14.8	65.6	14.8	10.4	--	--	--	105.6
Total hardwoods	--	2,006.4	1,722.3	1,229.5	945.6	517.3	586.5	83.8	7,091.4
Total, all species	209.9	2,225.8	1,909.1	1,404.5	1,091.1	588.3	737.0	105.6	8,271.3

[a] International 1/4-inch rule.
[b] Includes white and bur oaks.
[c] Includes scarlet and black oaks.

Table 49 .--Net volume of sawtimber on commercial forest land, by species and standard-lumber log grade, North-Central Unit, Pennsylvania, 1978.
(In millions of board feet)[a]

Species	Grade 1	Grade 2	Grade 3	Grade 4[b]	All classes
White and red pines	15.6	51.6	236.4	170.4	474.0
Yellow pines	5.1	33.1	81.9	--	120.1
Other softwoods[c]	--	--	--	--	585.8
Total softwoods	20.7	84.7	318.3	170.4	1,179.9
Select white oaks[d]	152.3	189.2	356.6	154.2	852.3
Northern red oak	445.0	466.3	789.1	219.5	1,919.9
Other oaks[e]	73.9	118.3	298.3	184.5	675.0
Chestnut oak	43.8	168.8	347.9	149.8	710.3
Hickory	13.9	32.1	91.5	39.2	176.7
Yellow birch	2.6	1.8	14.5	3.9	22.8
Sweet birch	1.4	46.2	101.8	17.6	167.0
Sugar maple	43.8	88.9	197.0	64.1	393.8
Red maple	61.9	142.2	457.5	119.3	780.9
Beech	23.9	51.8	108.4	39.7	223.8
Blackgum	2.7	10.9	18.6	4.4	36.6
White ash	57.5	38.1	115.2	33.1	243.9
Aspen	3.0	10.0	57.8	13.0	83.8
Basswood	13.0	39.4	109.1	21.1	182.6
Yellow-poplar	49.1	38.3	44.9	19.0	151.3
Black walnut	1.9	1.4	--	--	3.3
Black cherry	40.0	70.7	179.5	38.6	328.8
Black locust	--	--	28.4	4.6	33.0
Other hardwoods	18.5	21.2	53.2	12.7	105.6
Total hardwoods	1,048.2	1,535.6	3,369.3	1,138.3	7,091.4
Hardwood quality (in percent)	15	22	47	16	100
Hardwood sampling error (in percent)	9	5	5	6	3.5

[a] International 1/4-inch rule.
[b] Grade 4 applies only to white pine. For hardwoods the volumes in this column are for construction logs.
[c] Species other than pine are not graded into standard-lumber grades.
[d] Includes white and bur oaks.
[e] Includes scarlet and black oaks.

Table 50.--Sampling errors for major number of trees and timber-volume classes, North-Central Unit, Pennsylvania, 1978.

(In percent)

Species	Number of trees (Table 46)	Growing-stock volume (Table 47)	Sawtimber volume (Table 48)
White and red pines	19	20	24
Virginia pine	79	77	100
Other yellow pines	31	28	32
Hemlock	19	17	19
Other softwoods	70	64	--
Select white oaks	11	10	14
Northern red oak	12	9	10
Other oaks	16	13	14
Chestnut oak	12	11	15
Hickory	20	18	21
Yellow birch	26	20	36
Sweet birch	16	19	23
Sugar maple	16	16	21
Red maples	9	8	11
Beech	18	24	31
Blackgum	32	43	67
White ash	21	19	22
Aspen	18	18	32
Basswood	40	36	35
Yellow-poplar	25	24	26
Black walnut	83	66	59
Black cherry	13	11	15
Black locust	78	62	70
Other hardwoods	21	21	26
Dbh classes (inches)			
5.0 to 6.9	6	7	--
7.0 to 8.9	5	5	--
9.0 to 10.9	5	4	17
11.0 to 12.9	6	5	6
13.0 to 14.9	6	6	5
15.0 to 16.9	7	7	6
17.0 to 18.9	9	8	7
19.0 to 20.9	13	12	12
21.0 to 28.9	12	11	10
29.0 +	44	36	33

Table 51 Number of growing-stock trees on timberland by species and diameter class, South-Central Unit, Pennsylvania, 1978.

(In thousands of trees)

Species	Diameter class (inches at breast height)										All classes
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
White and red pines	3,566	2,288	855	813	299	123	153	80	41	--	8,218
Virginia pine	3,105	2,255	1,262	181	40	--	--	--	--	--	6,843
Other yellow pines	525	892	547	240	38	16	--	--	--	--	2,258
Hemlock	1,918	822	232	457	51	117	120	24	37	7	3,785
Other softwoods	1,213	321	412	--	--	--	--	--	--	--	1,946
Total softwoods	10,327	6,578	3,308	1,691	428	256	273	104	78	7	23,050
White oak	5,551	4,173	3,796	1,231	1,003	309	340	234	90	--	16,727
Northern red oak	8,367	4,474	4,093	2,811	1,525	1,335	729	568	656	62	24,620
Other oaks[a]	2,365	3,680	3,986	3,532	1,411	761	539	210	306	9	16,799
Chestnut oak	9,419	9,664	8,520	4,910	3,726	1,780	1,161	327	371	7	39,885
Hickory	842	1,771	1,696	819	345	337	--	--	51	--	5,861
Yellow birch	51	132	61	9	W	--	--	--	W	--	253
Sweet birch	6,782	3,752	1,583	476	305	198	201	133	33	--	13,463
Sugar maple	1,783	711	679	376	71	1	--	49	36	--	3,706
Red maple	12,479	5,694	1,859	1,411	524	W	71	--	32	11	22,081
Beech	385	37	29	153	50	--	W	30	--	--	684
Blackgum	2,574	580	277	61	72	44	115	25	49	--	3,797
White ash	2,886	1,654	1,220	1,188	613	616	175	56	51	10	8,469
Aspen	4	80	7	5	--	--	--	--	--	--	96
Basswood	339	519	105	1	133	74	87	29	40	11	1,338
Yellow-poplar	652	808	283	411	473	372	231	104	58	7	3,399
Black walnut	--	136	122	82	62	58	--	--	--	--	460
Black cherry	1,781	1,314	568	267	W	2	--	28	19	--	3,979
Black locust	1,638	1,840	1,244	351	213	161	55	--	16	--	5,518
Other hardwoods	2,727	1,182	1,340	685	419	125	--	54	50	7	6,589
Total hardwoods	60,625	42,201	31,468	18,779	10,945	6,173	3,704	1,847	1,858	124	177,724
Total, all species	70,952	48,779	34,776	20,470	11,373	6,429	3,977	1,951	1,936	131	200,774

[a]Includes scarlet, southern red, pin, post, and black oaks.
W-Less than 500 trees.

Table 52 .--Net volume of growing stock on commercial forest land, by species and diameter class, South-Central Unit, Pennsylvania, 1978.

(In millions of cubic feet)

Species	Diameter class (inches at breast height)										All classes
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.0	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
White and red pines	22.1	20.4	12.2	15.9	8.9	3.2	8.7	4.9	3.1	--	99.4
Virginia pine	4.6	12.8	12.8	3.8	1.1	--	--	--	--	--	35.1
Other yellow pines	0.9	4.1	4.3	3.7	1.0	0.5	--	--	--	--	14.5
Hemlock	8.6	5.2	2.1	9.2	1.3	4.6	5.2	2.0	3.7	1.2	43.1
Other softwoods	1.7	1.3	3.4	--	--	--	--	--	--	--	6.4
Total softwoods	37.9	43.8	34.8	32.6	12.3	8.3	13.9	6.9	6.8	1.2	198.5
White oak	16.8	27.3	44.5	25.8	32.5	11.3	17.8	17.2	9.7	--	202.9
Northern red oak	27.3	29.9	50.4	52.0	45.7	51.9	36.6	35.9	62.1	9.0	400.8
Other oaks[a]	8.8	24.7	45.2	64.9	37.0	28.8	29.8	14.6	20.2	1.2	275.2
Chestnut oak	31.2	60.0	90.9	82.6	93.0	56.4	50.3	18.0	25.7	1.2	509.3
Hickory	3.3	13.4	21.3	16.5	11.3	15.0	--	--	6.6	--	87.4
Yellow birch	0.2	0.8	0.7	0.1	W	--	--	--	W	--	1.8
Sweet birch	24.5	24.3	14.1	7.9	6.4	6.8	7.6	6.1	2.1	--	99.8
Sugar maple	7.4	5.5	8.3	8.5	1.8	W	--	3.0	3.0	--	37.5
Red maple	40.5	36.6	19.8	25.3	13.9	W	4.5	--	2.9	1.2	144.7
Beech	0.9	0.3	0.4	3.1	1.6	--	W	2.4	--	--	8.7
Blackgum	8.9	4.2	3.0	1.3	1.9	1.5	5.9	1.5	4.8	--	33.0
White ash	10.1	12.3	15.6	22.7	18.7	26.4	9.6	3.7	4.5	1.4	125.0
Aspen	W	0.6	0.1	0.1	--	--	--	--	--	--	0.8
Basswood	0.7	2.9	1.7	W	4.6	4.0	6.0	1.4	2.6	1.0	24.9
Yellow-poplar	1.8	5.0	3.5	7.1	11.7	13.5	11.1	5.8	4.8	1.2	65.5
Black walnut	--	0.9	2.0	1.2	1.4	1.7	--	--	--	--	7.2
Black cherry	6.5	7.2	4.9	4.1	W	W	--	1.6	2.0	--	26.3
Black locust	4.5	10.5	14.6	6.1	5.9	6.1	2.7	--	1.7	--	52.1
Other hardwoods	10.4	7.4	16.6	12.9	13.1	5.4	--	3.4	3.5	2.5	75.2
Total hardwoods	203.8	273.8	357.6	342.2	300.5	228.8	181.9	114.6	156.2	18.7	2,178.1
Total, all species	241.7	317.6	392.4	374.8	312.8	237.1	195.8	121.5	163.0	19.9	2,376.6

[a] Includes scarlet, southern red, pin, post, and black oaks.

Table 53.--Net volume of sawtimber on commercial forest land, by species and diameter class, South-Central Unit, Pennsylvania, 1978.

(In millions of board feet)[a]

Species	Diameter class (inches at breast height)								All classes
	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
White and red pines	36.1	51.9	31.8	13.2	35.5	19.6	12.9	--	201.0
Virginia pine	34.8	12.3	3.6	--	--	--	--	--	50.7
Other yellow pines	12.8	14.1	5.0	2.5	--	--	--	--	34.4
Hemlock	5.8	28.8	5.1	17.1	21.3	7.5	17.2	5.9	108.7
Other softwoods	8.8	--	--	--	--	--	--	--	8.8
Total softwoods	98.3	107.1	45.5	32.8	56.8	27.1	30.1	5.9	403.6
White oak	--	78.1	97.1	43.1	63.4	60.8	33.4	--	375.9
Northern red oak	--	177.5	151.1	186.2	123.6	133.3	257.8	29.9	1,059.4
Other oaks[b]	--	209.8	128.8	93.8	108.5	49.9	79.0	4.4	674.2
Chestnut oak	--	258.7	297.4	201.4	162.8	70.3	87.9	4.4	1,082.9
Hickory	--	48.3	31.0	44.8	--	--	22.7	--	146.8
Yellow birch	--	0.4	W	--	--	--	0.1	--	0.5
Sweet birch	--	24.7	17.4	23.2	23.2	19.7	8.2	--	116.4
Sugar maple	--	22.4	6.8	W	--	12.6	10.1	--	51.9
Red maple	--	73.3	43.2	W	14.7	--	10.0	5.0	146.2
Beech	--	8.5	4.8	--	W	7.3	--	--	20.6
Blackgum	--	3.5	6.0	4.2	24.0	4.4	16.4	--	58.5
White ash	--	63.6	59.8	90.7	32.0	11.5	14.5	5.6	277.7
Aspen	--	0.4	--	--	--	--	--	--	0.4
Basswood	--	0.1	12.9	11.2	18.7	4.3	8.6	3.3	59.1
Yellow-poplar	--	19.6	37.7	40.5	37.6	18.7	16.5	3.9	174.5
Black walnut	--	3.3	3.9	10.6	--	--	--	--	17.8
Black cherry	--	10.7	W	0.2	--	5.0	6.5	--	22.4
Black locust	--	16.2	15.6	17.8	8.3	--	5.6	--	63.5
Other hardwoods	--	33.4	35.2	15.9	--	10.4	11.7	9.1	115.7
Total hardwoods	--	1,052.5	948.7	783.6	616.8	408.2	589.0	65.6	4,464.4
Total, all species	98.3	1,159.6	994.2	816.4	673.6	435.3	619.1	71.5	4,868.0

[a] International 1/4-inch rule.
[b] Includes scarlet, pin, and black oaks.
W-Less than 50,000 board feet.

Table 54 .--Net volume of sawtimber on commercial forest land, by species and standard-lumber log grade, South-Central Unit, Pennsylvania, 1978.

(In millions of board feet)[a]

Species	Grade 1	Grade 2	Grade 3	Grade 4[b]	All classes
White and red pines	18.1	29.5	89.9	63.5	201.0
Yellow pines	4.7	8.3	72.1	--	85.1
Other softwoods[c]	--	--	--	--	117.5
Total softwoods	22.8	37.8	162.0	63.5	403.6
White oak	57.7	71.5	159.5	87.2	375.9
Northern red oak	330.8	230.7	393.0	104.9	1,059.4
Other oaks[d]	90.8	120.1	288.4	174.9	674.2
Chestnut oak	144.0	249.9	513.3	175.7	1,082.9
Hickory	12.2	19.2	74.6	40.8	146.8
Yellow birch	--	--	0.2	0.3	0.5
Sweet birch	15.6	22.9	60.9	17.0	116.4
Sugar maple	9.8	8.1	23.7	10.3	51.9
Red maple	3.1	10.4	95.9	36.8	146.2
Beech	0.4	3.1	15.0	2.1	20.6
Blackgum	18.1	11.0	17.6	11.8	58.5
White ash	58.9	79.0	103.9	35.9	277.7
Aspen	--	--	W	0.4	0.4
Basswood	13.3	20.0	22.6	3.2	59.1
Yellow-poplar	43.0	35.8	72.7	23.0	174.5
Black walnut	6.2	7.0	3.8	0.8	17.8
Black cherry	0.1	1.6	15.1	5.6	22.4
Black locust	--	8.7	44.9	9.9	63.5
Other hardwoods	3.3	28.3	56.3	27.8	115.7
Total hardwoods	807.3	927.3	1,961.4	768.4	4,464.4
Hardwood quality (in percent)	18	21	44	17	100
Hardwood sampling error (in percent)	8	5	5	6	3.2

[a] International 1/4-inch rule.

[b] Grade 4 applies only to white pine. For hardwoods the volumes in this column are for construction logs.

[c] Species other than pine are not graded into standard-lumber grades.

[d] Includes scarlet, pin, and black oaks.

W-Less than 50,000 board feet.

Table 55.--Sampling errors for major number of trees and timber-volume classes, South-Central Unit, Pennsylvania, 1978.

(In percent)

Species	Number of trees (Table 51)	Growing-stock volume (Table 52)	Sawtimber volume (Table 53)
White and red pines	28	24	21
Virginia pine	38	46	47
Other yellow pines	31	33	37
Hemlock	31	20	27
Other softwoods	98	98	100
Select white oaks	17	14	17
Northern red oak	10	9	9
Other oaks	12	11	12
Chestnut oak	10	9	10
Hickory	23	24	28
Yellow birch	29	31	44
Sweet birch	19	16	24
Sugar maple	33	32	41
Red maples	13	12	19
Beech	53	42	54
Blackgum	27	19	26
White ash	24	20	23
Aspen	35	37	48
Basswood	48	53	62
Yellow-poplar	39	36	36
Black walnut	47	44	46
Black cherry	38	31	39
Black locust	35	34	41
Other hardwoods	32	24	32
Dbh classes (inches)			
5.0 to 6.9	8	8	--
7.0 to 8.9	6	7	--
9.0 to 10.9	6	6	26
11.0 to 12.9	7	6	7
13.0 to 14.9	8	7	7
15.0 to 16.9	11	9	8
17.0 to 18.9	13	11	9
19.0 to 20.9	15	12	10
21.0 to 28.9	16	15	13
29.0 +	45	41	39

Table 56.--Number of growing-stock trees on commercial forest land, by species and diameter class, Northeastern Unit, Pennsylvania, 1978.

(In thousands of trees)

Species	Diameter class (inches at breast height)										All classes
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
White and red pines	4,857	2,415	1,856	1,044	538	348	154	96	120	19	11,447
Other yellow pines	W	2	1	1	W	W	--	--	--	--	4
Hemlock	5,005	2,720	2,634	2,088	1,018	588	138	46	70	--	14,307
Other softwoods	2	1	--	--	--	--	--	--	--	--	3
Total softwoods	9,864	5,138	4,491	3,133	1,556	936	292	142	190	19	25,761
White oak	1,653	2,291	864	889	89	58	28	75	28	--	5,975
Northern red oak	3,321	3,905	3,278	1,702	1,001	530	121	188	204	7	14,257
Other oaks[a]	922	260	538	118	201	74	21	W	1	--	2,135
Chestnut oak	2,221	2,647	2,494	789	164	95	47	20	1	--	8,478
Hickory	1,227	1,365	393	67	115	59	--	61	--	--	3,287
Yellow birch	2,076	722	388	310	104	33	--	--	W	--	3,633
Sweet birch	3,543	3,586	1,657	512	243	159	W	--	--	--	9,700
Sugar maple	9,708	6,510	3,837	2,337	1,072	464	220	58	55	17	24,278
Red maple	21,063	12,989	7,670	3,463	1,299	474	163	18	96	8	47,243
Beech	5,994	1,813	2,101	1,212	803	412	242	34	28	--	12,639
White ash	4,398	2,264	1,484	759	222	123	22	36	15	--	9,323
Aspen	4,107	1,447	1,626	600	236	--	--	--	--	--	8,016
Basswood	1,487	1,576	1,126	630	192	32	25	19	30	--	5,117
Yellow-poplar	--	138	--	--	--	--	--	--	--	--	138
Black walnut	--	--	--	--	--	37	--	18	--	--	55
Black cherry	1,529	2,295	1,629	975	541	210	200	71	44	--	7,494
Other hardwoods	574	513	240	65	34	--	54	--	94	12	1,586
Total hardwoods	63,823	44,321	29,325	14,428	6,316	2,760	1,143	598	596	44	163,354
Total, all species	73,687	49,459	33,816	17,561	7,872	3,696	1,435	740	786	63	189,115

[a]Includes scarlet and black oaks.

W-Less than 500 trees.

Table 57.--Net volume of growing stock on commercial forest land, by species and diameter class, Northeastern Unit, Pennsylvania, 1978.

(In millions of cubic feet)

Species	Diameter class (inches at breast height)										All classes
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
White and red pines	26.6	20.6	20.6	16.2	12.9	9.9	5.8	4.9	8.4	1.7	127.6
Other yellow pines	W	W	W	W	W	W	--	--	--	--	W
Hemlock	19.9	16.7	27.0	31.6	22.4	17.8	5.9	2.7	5.3	--	149.3
Other softwoods	W	W	--	--	--	--	--	--	--	--	W
Total softwoods	46.5	37.3	47.6	47.8	35.3	27.7	11.7	7.6	13.7	1.7	276.9
White oak	5.6	13.1	8.6	14.6	1.8	2.0	1.2	4.2	2.3	--	53.4
Northern red oak	12.6	27.7	37.1	28.9	23.9	17.0	4.8	9.3	13.3	0.9	175.5
Other oaks[a]	3.6	1.8	6.1	1.8	4.7	2.3	1.0	W	W	--	21.3
Chestnut oak	6.9	15.9	25.1	11.5	3.5	2.5	1.5	0.8	W	--	67.7
Hickory	4.4	10.0	4.1	1.0	2.8	1.9	--	2.6	--	--	26.8
Yellow birch	6.8	4.8	4.4	5.2	2.5	0.8	--	--	W	--	24.5
Sweet birch	12.2	20.5	17.7	8.0	5.3	4.4	W	--	--	--	68.1
Sugar maple	44.6	52.8	48.7	45.6	28.9	18.6	10.6	3.4	4.3	2.1	259.6
Red maple	76.1	93.9	94.2	63.2	35.0	17.1	7.2	0.8	5.2	0.6	393.3
Beech	25.2	13.1	24.8	22.8	22.4	14.1	11.5	2.1	2.0	--	138.0
White ash	16.0	16.2	17.6	15.2	6.4	4.6	1.2	1.8	1.0	--	80.0
Aspen	12.0	9.3	17.6	10.3	5.7	--	--	--	--	--	54.9
Basswood	6.0	11.5	14.4	13.1	5.9	1.1	1.2	1.2	2.3	--	56.7
Yellow-poplar	--	0.8	--	--	--	--	--	--	--	--	0.8
Black walnut	--	--	--	--	--	0.9	--	1.1	--	--	2.0
Black cherry	6.5	17.5	21.9	21.2	16.3	8.8	11.6	5.0	3.4	--	112.2
Other hardwoods	1.9	3.0	1.9	0.8	0.7	--	1.8	--	7.6	2.2	19.9
Total hardwoods	240.4	311.9	344.2	263.2	165.8	96.1	53.6	32.3	41.4	5.8	1,554.7
Total, all species	286.9	349.2	391.8	311.0	201.1	123.8	65.3	39.9	55.1	7.5	1,831.6

[a] Includes scarlet and black oaks.

W-Less than 50,000 cubic feet.

Table 58 .--Net volume of sawtimber on commercial forest land, by species and diameter class, Northeastern Unit, Pennsylvania, 1978.

(In millions of board feet)[a]

Species	Diameter class (inches at breast height)								All classes
	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
White and red pines	62.7	59.0	53.1	41.1	25.8	20.6	41.5	7.2	311.0
Other yellow pines	W	0.1	W	W	--	--	--	--	0.1
Hemlock	83.7	117.4	93.1	78.4	27.1	12.8	26.4	--	438.9
Total softwoods	146.4	176.5	146.2	119.5	52.9	33.4	67.9	7.2	750.0
White oak	--	48.5	5.8	7.3	5.5	17.4	9.0	--	93.5
Northern red oak	--	97.8	91.9	68.1	21.0	39.9	58.0	2.8	379.5
Other oaks[b]	--	6.3	18.1	10.1	3.8	W	0.2	--	38.5
Chestnut oak	--	38.9	14.0	9.6	6.7	2.9	0.1	--	72.2
Hickory	--	3.0	9.8	8.0	--	10.4	--	--	31.2
Yellow birch	--	17.9	9.7	3.0	--	--	W	--	30.6
Sweet birch	--	25.5	19.3	16.8	W	--	--	--	61.6
Sugar maple	--	148.6	104.0	73.9	42.8	13.0	17.4	10.1	409.8
Red maple	--	209.6	132.4	69.8	29.4	3.2	20.9	2.9	468.2
Beech	--	74.0	80.2	51.4	45.2	7.5	8.1	--	266.4
White ash	--	51.3	23.0	17.7	5.6	6.4	4.4	--	108.4
Aspen	--	35.8	22.0	--	--	--	--	--	57.8
Basswood	--	45.2	21.3	3.8	4.7	4.2	9.0	--	88.2
Black walnut	--	--	--	3.0	--	4.4	--	--	7.4
Black cherry	--	70.2	60.3	35.6	50.3	21.0	14.9	--	252.3
Other hardwoods	--	2.7	2.4	--	6.7	--	31.2	9.1	52.1
Total hardwoods	--	875.3	614.2	378.1	221.7	130.3	173.2	24.9	2,417.7
Total, all species	146.4	1,051.8	760.4	497.6	274.6	163.7	241.1	32.1	3,167.7

[a]International 1/4-inch rule.
[b]Includes scarlet and black oaks.
W-Less than 50,000 board feet.

Table 59.--Net volume of sawtimber on commercial forest land, by species and standard-lumber log grade, Northeastern Unit, Pennsylvania, 1978.

(In millions of board feet)[a]

Species	Grade 1	Grade 2	Grade 3	Grade 4[b]	All classes
ıite and red pines	1.5	19.0	145.9	144.6	311.0
ellow pines	W	W	0.1	--	0.1
ther softwoods[c]	--	--	--	--	438.9
Total softwoods	1.5	19.0	146.0	144.6	750.0
ıite oak	9.6	25.3	42.7	15.9	93.5
rthern red oak	98.5	94.1	145.7	41.2	379.5
ther oaks[d]	5.2	6.6	11.4	15.3	38.5
estnut oak	6.1	9.4	40.7	16.0	72.2
ckory	4.2	7.0	11.1	8.9	31.2
llow birch	0.3	5.9	19.7	4.7	30.6
eet birch	8.0	15.0	36.4	2.2	61.6
gar maple	59.5	98.2	192.3	59.8	409.8
d maple	23.6	69.0	298.6	77.0	468.2
ech	17.3	23.8	142.6	82.7	266.4
ite ash	19.3	45.2	31.2	12.7	108.4
pen	2.2	10.4	28.0	17.2	57.8
sswood	6.3	14.3	59.1	8.5	88.2
ack walnut	W	3.0	4.1	0.3	7.4
ack cherry	48.1	59.3	110.3	34.6	252.3
ther hardwoods	10.6	3.7	31.4	6.4	52.1
Total hardwoods	318.8	490.2	1,205.3	403.4	2,417.7
rdwood quality in percent)	13	20	50	17	100
Hardwood mpling error in percent)	13	10	7	10	6.3

[a] International 1/4-inch rule.

[b] Grade 4 applies only to white pine. For hardwoods the volumes in this column are for construction logs.

[c] Species other than pine are not graded into standard-lumber grades.

[d] Includes scarlet and black oaks.

W Less than 50,000 board feet.

Table 60.--Sampling errors for major number of trees and timber-volume classes, Northeastern Unit, Pennsylvania, 1978.

(In percent)

Species	Number of trees (Table 56)	Growing-stock volume (Table 57)	Sawtimber volume (Table 58)
White and red pines	39	31	29
Other yellow pines	45	41	48
Hemlock	23	22	23
Other softwoods	79	91	--
Select white oaks	41	36	33
Northern red oak	21	20	23
Other oaks	52	47	45
Chestnut oak	31	32	39
Hickory	32	30	47
Yellow birch	28	30	40
Sweet birch	18	19	32
Sugar maple	17	16	23
Red maples	14	12	18
Beech	17	15	18
Blackgum	35	41	102
White ash	23	18	21
Aspen	24	22	28
Basswood	40	30	30
Yellow-poplar	100	100	107
Black walnut	74	73	68
Black cherry	25	24	30
Black locust	--	--	--
Other hardwoods	41	55	75
Dbh classes (inches)			
5.0 to 6.9	8	9	--
7.0 to 8.9	8	7	--
9.0 to 10.9	8	6	28
11.0 to 12.9	9	6	7
13.0 to 14.9	12	10	9
15.0 to 16.9	14	13	10
17.0 to 18.9	16	16	14
19.0 to 20.9	23	22	20
21.0 to 28.9	21	21	20
29.0 +	44	45	43

Table 61.--Number of growing-stock trees on commercial forest land, by species and diameter class, Pocono Unit, Pennsylvania, 1978.

(In thousands of trees)

Species	Diameter class (inches at breast height)										All classes
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
White and red pines	938	1,100	648	777	143	246	133	51	119	19	4,174
Virginia pine	1,345	814	724	228	W	--	--	--	--	--	3,111
Other yellow pines	3,600	784	894	720	123	61	49	--	--	--	6,231
Hemlock	3,910	2,340	1,180	1,384	465	288	142	76	87	--	9,872
Other softwoods	242	--	--	50	--	--	24	--	16	--	332
Total softwoods	10,035	5,038	3,446	3,159	731	595	348	127	222	19	23,720
Select white oaks[a]	9,138	7,187	4,010	1,995	976	798	293	2	182	--	24,581
Northern red oak	5,130	4,586	3,160	1,713	1,019	628	361	234	182	7	17,020
Other oaks[b]	2,949	3,326	3,292	1,734	881	303	180	134	70	--	12,869
Chestnut oak	20,197	16,426	8,097	3,737	1,711	637	340	162	97	--	51,404
Hickory	872	174	577	80	--	31	49	--	--	--	1,783
Yellow birch	1,717	2,037	367	112	38	--	--	--	W	--	4,271
Sweet birch	5,206	2,860	1,198	427	351	62	26	--	--	--	10,130
Sugar maple	2,945	1,773	662	363	400	151	97	102	13	--	6,506
Red maple	27,972	9,401	4,169	1,586	578	136	149	20	17	--	44,028
Beech	850	1,713	788	652	198	34	79	22	--	--	4,336
Blackgum	3,106	547	320	217	--	94	1	21	10	--	4,316
White ash	2,238	1,139	700	374	209	81	21	22	W	--	4,784
Aspen	1,110	1,402	850	416	--	--	--	--	--	--	3,778
Basswood	177	232	314	W	43	--	--	19	--	--	785
Yellow-poplar	1,010	258	594	271	126	95	146	W	45	--	2,545
Black walnut	228	--	--	--	--	13	--	--	--	--	241
Black cherry	3,238	1,045	709	278	268	27	70	--	1	--	5,636
Black locust	653	409	2	56	82	--	--	--	--	--	1,202
Other hardwoods	700	152	198	273	--	--	--	--	--	--	1,323
Total hardwoods	89,436	54,667	30,007	14,284	6,880	3,090	1,812	738	617	7	201,538
Total, all species	99,471	59,705	33,453	17,443	7,611	3,685	2,160	865	839	26	225,258

[a] Includes white and swamp white oaks.
[b] Includes scarlet, pin, willow, and black oaks.
W-Less than 500 trees.

Table 62.--Net volume of growing stock on commercial forest land, by species and diameter class, Pocono Unit, Pennsylvania, 1978.

(In millions of cubic feet)

Species	Diameter class (inches at breast height)										All classes
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
White and red pines	4.1	8.5	7.0	11.6	3.5	7.6	6.0	2.7	8.8	2.6	62.4
Virginia pine	2.7	3.3	6.1	3.0	W	--	--	--	--	--	15.1
Other yellow pines	7.8	3.7	8.4	10.3	2.8	1.8	1.9	--	--	--	36.7
Hemlock	14.9	13.5	11.4	18.7	9.4	7.6	5.8	3.9	5.6	--	90.8
Other softwoods	0.7	--	--	0.7	--	--	0.8	--	0.8	--	3.0
Total softwoods	30.2	29.0	32.9	44.3	15.7	17.0	14.5	6.6	15.2	2.6	208.0
Select white oaks[a]	29.4	43.2	38.8	31.1	22.0	24.9	12.9	0.1	13.5	--	215.9
Northern red oak	18.6	30.9	35.2	27.7	22.4	19.8	14.3	12.1	12.3	0.7	194.0
Other oaks[b]	11.5	22.7	35.4	27.5	20.4	9.2	7.3	6.6	3.7	--	144.3
Chestnut oak	64.4	91.0	73.4	49.8	32.9	15.8	11.1	6.4	5.3	--	350.1
Hickory	3.9	1.3	6.0	1.2	--	1.2	2.0	--	--	--	15.6
Yellow birch	6.3	12.4	4.1	1.6	1.0	--	--	--	W	--	25.4
Sweet birch	15.8	17.6	11.7	6.4	6.4	1.8	0.9	--	--	--	60.6
Sugar maple	10.9	14.6	8.5	7.1	10.3	4.5	4.0	5.8	0.9	--	66.6
Red maple	103.9	64.7	44.8	27.0	12.5	4.3	5.7	0.8	0.8	--	264.5
Beech	3.5	13.0	10.0	13.5	5.6	1.7	4.2	1.8	--	--	53.3
Blackgum	12.0	3.1	2.9	3.3	--	3.6	0.1	1.1	1.0	--	27.1
White ash	7.8	7.6	7.2	6.7	5.8	3.0	0.9	1.0	W	--	40.0
Aspen	3.7	10.1	10.8	7.8	--	--	--	--	--	--	32.4
Basswood	0.7	1.9	3.5	W	1.2	--	--	1.5	--	--	8.8
Yellow-poplar	5.0	1.9	7.1	5.3	3.8	3.2	6.5	W	3.1	--	35.9
Black walnut	0.6	--	--	--	--	0.4	--	--	--	--	1.0
Black cherry	10.3	6.7	8.0	4.5	7.4	1.0	3.0	--	0.1	--	41.0
Black locust	2.3	2.2	W	1.0	2.2	--	--	--	--	--	7.7
Other hardwoods	2.3	0.8	2.2	4.3	--	--	--	--	--	--	9.6
Total hardwoods	312.9	345.7	309.6	225.8	153.9	94.4	72.9	37.2	40.7	0.7	1,593.8
Total, all species	343.1	374.7	342.5	270.1	169.6	111.4	87.4	43.8	55.9	3.3	1,801.8

[a] Includes white and swamp white oaks.
[b] Includes scarlet, pin, willow, and black oaks.

Table 63 --Net volume of [illegible]
Pocono Unit, Pennsylvania, 1978.

(In millions of board feet)[a]

Species	Diameter class (inches at breast height)								All classes
	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
White and red pines	20.3	39.8	14.1	30.7	25.4	10.9	39.5	11.3	192.0
Virginia pine	15.2	9.3	W	--	--	--	--	--	24.5
Other yellow pines	23.5	34.4	10.4	6.1	7.7	--	--	--	82.1
Hemlock	31.6	63.0	33.7	28.7	25.8	17.5	25.3	--	225.6
Other softwoods	--	1.9	--	--	3.3	--	3.3	--	8.5
Total softwoods	90.6	148.4	58.2	65.5	62.2	28.4	68.1	11.3	532.7
White oak	--	96.5	75.4	88.0	50.0	0.6	51.3	--	361.8
Northern red oak	--	89.2	77.1	74.8	53.7	48.7	51.7	4.2	399.4
Other oaks[b]	--	95.5	77.6	35.0	29.9	24.6	15.6	--	278.2
Chestnut oak	--	152.2	109.7	60.8	42.8	25.4	20.1	--	411.0
Hickory	--	4.5	--	4.9	7.8	--	--	--	17.2
Yellow birch	--	4.8	3.6	--	--	--	W	--	8.4
Sweet birch	--	21.3	22.7	6.3	3.0	--	--	--	53.3
Sugar maple	--	19.9	33.8	14.8	14.0	22.2	2.8	--	107.5
Red maple	--	80.4	39.6	16.1	22.7	2.9	2.8	--	164.5
Beech	--	38.9	18.3	5.7	14.7	6.5	--	--	84.1
Blackgum	--	9.6	--	12.7	0.3	4.4	2.9	--	29.9
White ash	--	20.4	20.3	11.5	3.4	3.8	W	--	59.4
Aspen	--	24.0	--	--	--	--	--	--	24.0
Basswood	--	W	3.7	--	--	6.0	--	--	9.7
Yellow-poplar	--	19.8	13.6	12.2	24.7	W	12.2	--	82.5
Black walnut	--	--	--	2.1	--	--	--	--	2.1
Black cherry	--	12.5	23.6	3.3	10.2	--	0.4	--	50.0
Black locust	--	2.7	7.6	--	--	--	--	--	10.3
Other hardwoods	--	13.2	--	--	--	--	--	--	13.2
Total hardwoods	--	705.4	526.6	348.2	277.2	145.1	159.8	4.2	2,166.5
Total, all species	90.6	853.8	584.8	413.7	339.4	173.5	227.9	15.5	2,699.2

[a] International 1/4-inch rule.
[b] Includes scarlet, willow, and black oaks.
W-Less than 50,000 board feet.

Table 64.--Net volume of sawtimber on commercial forest land, by species and standard-lumber log grade, Pocono Unit, Pennsylvania, 1978.

(In millions of board feet)[a]

Species	Grade 1	Grade 2	Grade 3	Grade 4[b]	All class
White and red pines	4.6	28.6	86.3	72.5	192.0
Yellow pines	8.6	9.8	88.2	--	106.6
Other softwoods[c]	--	--	--	--	234.1
Total softwoods	13.2	38.4	174.5	72.5	532.7
White oak	58.8	92.1	136.0	74.9	361.8
Northern red oak	65.6	120.9	172.0	40.9	399.4
Other oaks[d]	25.3	52.5	131.5	68.9	278.2
Chestnut oak	31.0	96.3	220.7	63.0	411.0
Hickory	--	--	8.9	8.3	17.2
Yellow birch	0.1	0.1	4.3	3.9	8.4
Sweet birch	4.9	9.9	31.2	7.3	53.3
Sugar maple	12.9	31.8	40.7	22.1	107.5
Red maple	1.8	33.9	97.4	31.4	164.5
Beech	0.9	6.0	48.3	28.9	84.1
Blackgum	--	10.9	15.6	3.4	29.9
White ash	4.4	22.0	25.6	7.4	59.4
Aspen	--	2.1	15.2	6.7	24.0
Basswood	--	W	9.0	0.7	9.7
Yellow-poplar	25.3	13.8	33.8	9.6	82.5
Black walnut	1.2	0.9	--	--	2.1
Black cherry	8.3	10.0	24.7	7.0	50.0
Black locust	--	2.6	6.5	1.2	10.3
Other hardwoods	--	2.3	9.4	1.5	13.2
Total hardwoods	240.5	508.1	1,030.8	387.1	2,166.5
Hardwood quality (in percent)	11	23	48	18	100
Hardwood sampling error (in percent)	12	8	7	8	5.7

[a]International 1/4-inch rule.

[b]Grade 4 applies only to white pine. For hardwoods the volumes in this column are for construction logs.

[c]Species other than pine are not graded into standard-lumber grades.

[d]Includes scarlet, willow, and black oaks.

W-Less than 50,000 board feet.

Table 65.--Sampling errors for major number of trees and timber volume classes, Pocono Unit, Pennsylvania, 1978.

(In percent)

Species	Number of trees (Table 61)	Growing-stock volume (Table 62)	Sawtimber volume (Table 63)
White and red pines	27	23	22
Virginia pine	54	59	61
Other yellow pines	46	35	36
Hemlock	28	25	25
Other softwoods	71	60	75
Select white oaks	15	13	16
Northern red oak	12	10	12
Other oaks	14	15	18
Chestnut oak	11	10	14
Hickory	35	40	77
Yellow birch	45	47	59
Sweet birch	20	19	25
Sugar maple	41	36	47
Red maples	12	11	27
Beech	39	35	35
Blackgum	32	32	46
White ash	26	23	30
Aspen	26	24	41
Basswood	61	53	72
Yellow-poplar	38	38	41
Black walnut	95	71	74
Black cherry	56	40	59
Black locust	55	57	76
Other hardwoods	44	37	44
Dbh classes (inches)			
5.0 to 6.9	7	7	--
7.0 to 8.9	6	6	--
9.0 to 10.9	7	6	25
11.0 to 12.9	8	7	8
13.0 to 14.9	10	9	8
15.0 to 16.9	11	11	10
17.0 to 18.9	13	13	11
19.0 to 20.9	19	17	15
21.0 to 28.9	17	16	15
29.0 +	59	63	60

Table 66.--Number of growing-stock trees on commercial forest land, by species and diameter class, Southeastern Unit, Pennsylvania, 1978.

(In thousands of trees)

Species	Diameter class (inches at breast height)										All classes
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
White and red pines	1,136	475	516	204	106	23	56	19	13	--	2,548
Virginia pine	909	556	406	244	99	72	--	--	--	--	2,286
Other yellow pines	55	361	431	184	178	18	--	--	--	--	1,227
Hemlock	578	18	80	76	55	39	W	W	W	--	846
Other softwoods	1,360	674	86	--	--	--	--	--	--	--	2,120
Total softwoods	4,038	2,084	1,519	708	438	152	56	19	13	--	9,027
White oak	2,326	805	808	689	603	566	444	141	102	18	6,502
Northern red oak	2,742	2,492	2,493	1,719	573	474	384	172	149	12	11,210
Other oaks[a]	2,587	2,512	2,119	2,086	1,919	968	904	230	605	7	13,937
Chestnut oak	10,107	7,544	5,395	3,615	2,368	1,047	291	121	146	--	30,634
Hickory	2,575	1,647	1,865	1,285	833	259	237	95	150	--	8,946
Yellow birch	11	471	58	44	--	--	--	--	8	--	592
Sweet birch	3,023	1,625	1,377	476	156	155	23	--	78	--	6,913
Sugar maple	58	526	2	--	1	--	--	2	--	--	589
Red maples[b]	5,821	2,103	1,031	1,032	724	341	176	60	125	61	11,474
Beech	901	418	205	266	80	117	84	22	67	5	2,165
Blackgum	521	1,187	408	93	32	34	3	--	--	--	2,278
White ash	1,890	3,157	965	775	741	179	357	84	114	32	8,294
Aspen	W	296	--	W	--	--	--	--	--	--	296
Basswood	1	3	5	W	--	--	--	--	--	--	9
Yellow-poplar	1,655	1,116	1,087	1,516	740	991	280	202	380	64	8,031
Black walnut	199	99	64	58	199	97	54	--	--	--	770
Black cherry	432	693	--	64	W	95	24	22	2	--	1,332
Black locust	326	357	126	126	37	161	25	79	12	--	1,249
Other hardwoods	2,295	941	384	257	160	123	48	63	33	--	4,304
Total hardwoods	37,470	27,992	18,392	14,101	9,166	5,607	3,334	1,293	1,971	199	119,525
Total, all species	41,508	30,076	19,911	14,809	9,604	5,759	3,390	1,312	1,984	199	128,552

[a] Includes scarlet, pin, and black oaks.
[b] Includes 592,000 silver maple trees

Table 67.--Net volume of growing stock on commercial forest land, by species and diameter class, Southeastern Unit, Pennsylvania, 1978.

(In millions of cubic feet)

Species	Diameter class (inches at breast height)										All classes
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
White and red pines	4.5	3.7	5.9	3.3	2.2	0.7	2.5	1.1	1.2	--	25.1
Virginia pine	1.4	2.3	3.7	3.6	1.8	1.8	--	--	--	--	14.6
Other yellow pines	0.1	1.7	3.9	3.0	4.2	0.7	--	--	--	--	13.6
Hemlock	1.5	0.1	0.7	1.0	1.4	1.5	W	W	W	--	6.2
Other softwoods	3.3	2.4	0.6	--	--	--	--	--	--	--	6.3
Total softwoods	10.8	10.2	14.8	10.9	9.6	4.7	2.5	1.1	1.2	--	65.8
White oak	6.3	5.7	9.1	13.5	17.9	22.7	22.5	10.4	8.7	5.0	121.8
Northern red oak	8.8	15.1	26.9	29.3	15.8	16.7	17.5	9.0	12.4	1.8	153.3
Other oaks[a]	8.8	15.1	22.6	35.5	49.2	33.9	43.1	13.9	47.0	0.9	270.0
Chestnut oak	27.5	40.2	52.8	58.6	54.5	32.3	11.8	7.5	10.3	--	295.5
Hickory	8.7	9.8	22.2	25.2	23.2	10.1	11.8	6.0	12.9	--	129.9
Yellow birch	W	3.0	0.7	0.7	--	--	--	--	0.8	--	5.2
Sweet birch	9.7	9.8	13.6	7.2	3.4	5.5	0.7	--	6.9	--	56.8
Sugar maple	0.1	4.2	W	--	0.1	--	--	0.1	--	--	4.5
Red maples[b]	19.3	12.4	10.6	17.4	15.3	11.2	7.3	3.3	9.1	8.6	114.5
Beech	3.8	3.9	2.3	5.0	2.2	3.3	3.4	1.0	5.1	0.9	30.9
Blackgum	1.8	7.6	4.0	1.8	1.2	1.2	0.1	--	--	--	17.7
White ash	6.1	19.9	11.0	12.9	23.0	6.2	18.0	7.0	10.8	5.3	120.2
Aspen	W	1.4	--	W	--	--	--	--	--	--	1.4
Basswood	W	W	0.1	W	--	--	--	--	--	--	0.1
Yellow-poplar	6.2	5.9	11.9	27.0	20.9	35.3	14.0	11.6	31.8	9.0	173.6
Black walnut	0.6	0.8	0.8	0.8	4.6	4.0	2.3	--	--	--	13.9
Black cherry	1.2	3.3	--	0.8	W	2.6	0.8	0.8	0.2	--	9.7
Black locust	0.5	2.1	1.8	1.7	1.0	5.0	1.2	3.7	1.2	--	18.2
Other hardwoods	6.8	6.7	4.0	5.1	4.4	5.0	2.6	3.5	2.8	--	40.9
Total hardwoods	116.2	166.9	194.4	242.5	236.7	195.0	157.1	77.8	160.0	31.5	1,578.1
Total, all species	127.0	177.1	209.2	253.4	246.3	199.7	159.6	78.9	161.2	31.5	1,643.9

[a] Includes scarlet, pin and black oaks.

[b] Includes 11.8 million cubic feet of silver maple.

W-Less than 50,000 cubic feet.

Table 68.--Net volume of sawtimber on commercial forest land, by species and diameter class, Southeastern Unit, Pennsylvania, 1978.

(In millions of board feet)[a]

Species	Diameter class (inches at breast height)								All classes
	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
White and red pines	17.5	11.0	8.2	3.2	11.9	6.3	5.5	--	63.6
Virginia pine	10.2	13.0	7.0	8.0	--	--	--	--	38.2
Other yellow pines	12.2	12.0	16.9	3.6	--	--	--	--	44.7
Hemlock	2.2	3.6	4.0	5.2	W	W	W	--	15.0
Other softwoods	1.9	--	--	--	--	--	--	--	1.9
Total softwoods	44.0	39.6	36.1	20.0	11.9	6.3	5.5	--	163.4
White oak	--	38.9	57.1	76.9	80.9	37.3	33.5	17.6	342.2
Northern red oak	--	90.3	51.4	59.4	63.6	37.4	50.3	6.7	359.1
Other oaks[b]	--	106.9	161.2	118.6	155.8	50.8	178.8	3.5	775.6
Chestnut oak	--	173.0	180.2	116.1	43.4	27.4	38.1	--	578.2
Hickory	--	69.7	72.8	34.0	41.8	21.3	46.7	--	286.3
Yellow birch	--	2.0	--	--	--	--	3.4	--	5.4
Sweet birch	--	20.7	11.6	17.4	2.5	--	24.5	--	76.7
Sugar maple	--	--	0.2	--	--	0.5	--	--	0.7
Red maples[c]	--	47.9	48.4	36.7	25.0	12.6	34.3	35.0	239.9
Beech	--	12.6	6.2	10.2	10.9	3.6	19.3	3.5	66.3
Blackgum	--	4.9	3.3	4.0	0.6	--	--	--	12.8
White ash	--	35.2	68.2	21.9	62.8	22.7	40.3	19.8	270.9
Aspen	--	W	--	--	--	--	--	--	W
Basswood	--	W	--	--	--	--	--	--	W
Yellow-poplar	--	73.2	63.5	115.4	50.2	42.4	122.1	32.3	499.1
Black walnut	--	2.6	13.9	15.5	8.2	--	--	--	40.2
Black cherry	--	2.4	W	8.2	2.6	2.7	0.5	--	16.4
Black locust	--	5.1	3.5	17.8	4.7	14.8	4.9	--	50.8
Other hardwoods	--	13.9	13.8	16.9	9.5	14.8	10.9	--	79.8
Total hardwoods	--	699.3	755.3	669.0	562.5	288.3	607.6	118.4	3,700.4
Total, all species	44.0	738.9	791.4	689.0	574.4	294.6	613.1	118.4	3,863.8

a International 1/4-inch rule.
b Includes scarlet, pin, and black oaks.
c Includes 40.0 million board feet of silver maple.

W-Less than 50,000 board feet.

Table 69.--Net volume of sawtimber on commercial forest land, by species and standard-lumber log grade, Southeastern Unit, Pennsylvania, 1978.

(In millions of board feet)[a]

Species	Grade 1	Grade 2	Grade 3	Grade 4[b]	All classes
White and red pines	5.1	14.5	26.0	18.0	63.6
Yellow pines	5.5	5.7	71.7	--	82.9
Other softwoods[c]	--	--	--	--	16.9
Total softwoods	10.6	20.2	97.7	18.0	163.4
White oak	73.9	58.3	133.5	76.5	342.2
Northern red oak	90.5	75.0	159.1	34.5	359.1
Other oaks[d]	139.7	186.1	276.3	173.5	775.6
Chestnut oak	47.4	162.2	292.0	76.6	578.2
Hickory	12.9	46.7	155.7	71.0	286.3
Yellow birch	W	2.6	2.5	0.3	5.4
Sweet birch	13.7	21.7	34.5	6.8	76.7
Sugar maple	--	0.4	0.2	0.1	0.7
Red maples[e]	13.5	32.7	141.1	52.6	239.9
Beech	0.5	7.3	19.0	39.5	66.3
Blackgum	--	2.6	8.0	2.2	12.8
White ash	61.4	58.2	114.7	36.6	270.9
Aspen	--	--	W	W	W
Basswood	--	W	W	W	W
Yellow-poplar	137.9	103.6	181.8	75.8	499.1
Black walnut	7.2	5.9	22.6	4.5	40.2
Black cherry	3.3	3.8	6.9	2.4	16.4
Black locust	1.7	5.5	38.5	5.1	50.8
Other hardwoods	12.5	14.6	40.6	12.1	79.8
Total hardwoods	616.1	787.2	1,627.0	670.1	3,700.4
Hardwood quality (in percent)	17	21	44	18	100
Hardwood sampling error (in percent)	11	8	6	8	4.5

[a] International 1/4-inch rule.

[b] Grade 4 applies only to white pine. For hardwoods the volumes in this column are for construction logs.

[c] Species other than pine are not graded into standard-lumber grades.

[e] Includes 40.0 million board feet of silver maple.

W-Less than 50,000 board feet.

Table 70.--Sampling errors for major number of trees and timber-volume classes, Southeastern Unit, Pennsylvania, 1978.

(In percent)

Species	Number of trees (Table 66)	Growing-stock volume (Table 67)	Sawtimber volume (Table 68)
White and red pines	39	40	46
Virginia pine	74	70	75
Other yellow pines	52	45	38
Hemlock	54	53	67
Other softwoods	89	92	102
Select white oaks	18	18	19
Northern red oak	21	19	22
Other oaks	15	15	17
Chestnut oak	18	15	17
Hickory	21	24	29
Yellow birch	78	63	92
Sweet birch	33	32	47
Sugar maple	64	72	72
Red maples	19	25	33
Beech	33	35	40
Blackgum	27	24	47
White ash	19	20	24
Aspen	97	95	106
Basswood	67	57	96
Yellow-poplar	21	17	18
Black walnut	46	42	43
Black cherry	54	42	65
Black locust	49	64	82
Other hardwoods	32	32	33
Dbh classes (inches)			
5.0 to 6.9	11	10	--
7.0 to 8.9	10	10	--
9.0 to 10.9	9	9	45
11.0 to 12.9	9	8	9
13.0 to 14.9	9	7	8
15.0 to 16.9	10	9	9
17.0 to 18.9	12	11	10
19.0 to 20.9	15	14	13
21.0 to 28.9	29	20	17
29.0 +	35	35	34

Table 71.--Land area with sampling error, by county, geographic unit, and land class, Pennsylvania, 1978.

County and geographic unit	Forest land			Nonforest land	Total land[b]	Proportion commercial[c]	Sampling error[d]
	Noncommercial[a]	Commercial					
		Public	Private				
	Thousand acres					Percent	
Allegheny	45.8	1.1	128.3	290.7	465.9	28	11
Armstrong	.5	5.9	213.9	197.0	417.3	53	6
Beaver	8.9	4.0	135.0	133.7	281.6	49	10
Butler	13.1	7.9	235.6	251.6	508.2	48	6
Crawford	19.8	18.0	304.3	305.6	647.7	50	9
Erie	3.2	9.0	203.1	305.0	520.3	41	6
Greene	1.3	8.7	205.5	154.4	369.9	58	6
Indiana	4.6	12.7	287.3	223.4	528.0	57	4
Lawrence	3.6	1.7	76.0	153.6	234.9	33	21
Mercer	7.2	5.5	162.6	253.5	428.8	39	15
Washington	4.1	6.0	203.5	334.9	548.5	38	9
Westmoreland	8.0	28.3	270.4	348.6	655.3	46	5
Western Unit	120.1	108.8	2,425.5	2,952.0	5,606.4	45	2.3
Bedford	15.0	73.0	348.7	214.8	651.5	65	2
Blair	11.6	51.9	157.7	118.0	339.2	62	3
Cambria	20.3	46.7	208.7	167.2	442.9	58	4
Fayette	30.9	34.5	269.7	178.2	513.3	59	6
Somerset	23.8	61.7	344.5	259.9	689.9	59	3
Southwestern Unit	101.6	267.8	1,329.3	938.1	2,636.8	61	1.8
Cameron	10.2	138.3	102.3	5.8	256.6	94	1
Elk	10.6	244.0	218.3	43.6	516.5	90	1
Forest	3.0	122.4	125.0	17.8	268.2	92	1
McKean	8.1	161.2	390.3	75.3	634.9	87	1
Potter	5.3	278.7	316.8	98.1	698.9	85	2
Sullivan	2.8	89.3	162.1	51.7	305.9	82	2
Tioga	15.0	159.1	314.5	244.8	733.4	65	3
Warren	1.7	171.1	288.8	117.6	579.2	79	3
Allegheny Unit	56.7	1,364.1	1,918.1	654.7	3,993.6	82	1.0

Table 71.--Continued

County and geographic unit	Forest land			Nonforest land	Total land[b]	Proportion commercial[c]	Sampling error[d]
	Noncommercial[a]	Commercial					
		Public	Private				
	Thousand acres					Percent	
Centre	42.6	178.5	325.0	167.5	713.6	71	2
Clarion	5.0	13.7	203.6	159.8	382.1	57	2
Clearfield	9.8	113.6	455.5	150.0	728.9	78	3
Clinton	83.6	199.0	230.0	62.8	575.4	75	1
Jefferson	1.5	43.4	230.4	142.0	417.3	66	2
Lycoming	44.1	203.8	350.2	179.5	777.6	71	2
Venango	9.8	19.9	293.2	111.0	433.9	72	4
North-Central Unit	196.4	771.9	2,087.9	972.6	4,028.8	71	1.0
Dauphin	10.2	58.6	91.2	171.5	331.5	45	3
Franklin	7.9	62.4	137.2	275.1	482.6	41	4
Fulton	3.2	44.5	134.1	96.6	278.4	64	2
Huntingdon	39.5	84.5	300.5	148.3	572.8	67	3
Juniata	8.0	20.9	132.5	85.7	247.1	62	4
Mifflin	17.6	48.2	114.9	95.1	275.8	59	2
Perry	13.0	46.5	164.2	128.9	352.6	60	2
Snyder	5.4	25.3	67.1	111.5	209.3	44	4
Union	27.7	53.9	55.5	66.4	203.5	54	2
South-Central Unit	132.5	444.8	1,197.2	1,179.1	2,953.6	56	1.0
Bradford	1.3	47.0	333.8	352.6	734.7	52	5
Lackawanna	9.5	17.7	170.2	93.2	290.6	65	4
Susquehanna	1.2	12.6	307.4	211.9	533.1	60	3
Wayne	3.3	14.4	292.8	163.8	474.3	65	4
Wyoming	1.0	27.6	133.8	92.3	254.7	63	5
Northeastern Unit	16.3	119.3	1,238.0	913.8	2,287.4	59	2.1
Carbon	27.9	43.7	117.2	69.7	258.5	62	4
Columbia	2.5	16.4	123.0	167.9	309.8	45	5
Luzerne	27.7	37.2	326.3	175.8	567.0	64	3
Monroe	18.1	42.6	241.2	89.1	391.0	73	1
Montour	0.3	0.4	23.2	59.3	83.2	28	18

Northumberland	0.1	9.6	103.4	176.8	289.9	39	6
Pike	26.8	70.9	202.1	47.1	346.9	79	1
Schuylkill	48.7	38.3	261.2	153.6	501.8	60	2
Pocono Unit	152.1	259.1	1,397.6	939.3	2,748.1	60	1.0
Adams	3.1	20.1	83.7	229.7	336.6	31	6
Berks	17.5	22.1	129.5	382.6	551.7	27	6
Bucks	23.3	4.1	75.6	290.0	393.0	20	11
Chester	13.7	3.6	84.0	385.8	487.1	18	14
Cumberland	6.1	35.4	74.2	239.5	355.2	31	10
Delaware	17.9	--	--	99.9	117.8	0	--
Lancaster	2.4	8.2	87.9	506.9	605.4	16	7
Lebanon	9.8	23.6	26.6	172.3	232.3	22	16
Lehigh	1.5	3.5	49.3	168.4	222.7	24	9
Montgomery	6.5	0.6	64.9	245.4	317.4	21	18
Northampton	2.6	10.8	45.2	182.0	240.6	23	7
Philadelphia	5.1	--	--	76.8	81.9	0	--
York	17.0	3.1	138.3	423.4	581.8	24	6
Southeastern Unit	126.5	135.1	859.2	3,402.7	4,523.5	22	2.8
All counties	902.2	3,470.9	12,452.8	11,952.3	28,778.2	55	.6

[a]Includes productive-reserved, urban and unproductive forest land.
[b]Source: U.S. Dep. Commer., Bur. Census. 1973. Census of Population, 1970 Vol. I.
[c]Percentage of total land area that is in commercial forest.
[d]For commercial forest land.

Table 72.--Area of commercial forest land, by county, geographic unit, and stand-size class, Pennsylvania, 1978.

(In thousands of acres)

County[a] and geographic unit	Sawtimber stands	Poletimber stands	Other stands	All classes
Allegheny	53.2	--	76.2	129.4
Armstrong	78.5	58.3	83.0	219.8
Beaver/Lawrence/Mercer	152.1	90.3	142.4	384.8
Butler	108.2	64.3	71.0	243.5
Crawford	120.9	67.8	133.6	322.3
Erie	86.7	37.3	88.1	212.1
Greene/Washington	121.9	162.9	138.9	423.7
Indiana	156.2	72.4	71.4	300.0
Westmoreland	163.3	94.0	41.4	298.7
Western Unit	1,041.0	647.3	846.0	2,534.3
Bedford	190.7	134.6	96.4	421.7
Blair	107.8	80.1	21.7	209.6
Cambria	179.2	21.6	54.6	255.4
Fayette	128.6	112.2	63.4	304.2
Somerset	147.6	145.4	113.2	406.2
Southwestern Unit	753.9	493.9	349.3	1,597.1
Cameron/Potter	417.4	382.3	36.4	836.1
Elk	229.4	170.9	62.0	462.3
Forest	150.4	90.4	6.6	247.4
McKean	327.0	180.5	44.0	551.5
Sullivan	164.7	62.0	24.7	251.4
Tioga	222.0	195.8	55.8	473.6
Warren	274.2	132.3	53.4	459.9
Allegheny Unit	1,785.1	1,214.2	282.9	3,282.2
Centre	283.5	151.5	68.5	503.5
Clarion	100.0	43.8	73.5	217.3
Clearfield	205.1	175.4	188.6	569.1
Clinton	214.0	182.8	32.2	429.0
Jefferson	204.0	36.1	33.7	273.8
Lycoming	362.0	141.5	50.5	554.0
Venango	165.2	79.9	68.0	313.1
North-Central Unit	1,533.8	811.0	515.0	2,859.8
Dauphin	39.8	66.0	44.0	149.8
Franklin	117.2	50.0	32.4	199.6
Fulton	103.0	14.7	60.9	178.6
Huntingdon	167.4	124.6	93.0	385.0
Juniata/Mifflin	156.2	141.1	19.2	316.5
Perry	145.9	47.7	17.1	210.7
Snyder/Union	83.3	60.8	57.7	201.8
South-Central Unit	812.8	504.9	324.3	1,642.0
Bradford	111.9	155.4	113.5	380.8
Lackawanna	60.8	42.4	84.7	187.9
Susquehanna	87.8	135.8	96.4	320.0
Wayne	150.1	129.4	27.7	307.2
Wyoming	60.6	87.8	13.0	161.4
Northeastern Unit	471.2	550.8	335.3	1,357.3
Carbon	26.4	66.4	68.1	160.9
Columbia/Montour/Northumberland	114.0	107.0	55.0	276.0
Luzerne	95.2	128.1	140.2	363.5
Monroe	121.8	95.3	66.7	283.8
Pike	156.1	98.3	18.6	273.0
Schuylkill	23.7	153.3	122.5	299.5
Pocono Unit	537.2	648.4	471.1	1,656.7
Adams/Cumberland/York	276.6	55.6	22.6	354.8
Berks	109.0	21.6	21.0	151.6
Bucks/Lehigh/Northampton	103.5	21.4	63.6	188.5
Chester/Montgomery	97.2	17.8	38.1	153.1
Lancaster/Lebanon	104.2	21.2	20.9	146.3
Southeastern Unit	690.5	137.6	166.2	994.3
All counties	7,625.5	5,008.1	3,290.1	15,923.7

[a]Multi-county groupings are used for counties with too few forested field sample plots or with other sampling anomalies. This is done when more detailed county-level data are presented in order to minimize sampling errors.

Table 73.--Area of commercial forest land, by county, geographic unit, and major forest-type group, Pennsylvania, 1978.

(In thousands of acres)

County[a] and geographic unit	Softwood types[b]	Oak types[c]	Northern hardwood types[d]	All types
Allegheny	12.4	51.6	65.4	129.4
Armstrong	13.9	119.9	86.0	219.8
Beaver/Lawrence/Mercer	--	211.4	173.4	384.8
Butler	11.4	70.5	161.6	243.5
Crawford	6.9	55.0	260.4	322.3
Erie	13.6	--	198.5	212.1
Greene/Washington	17.9	212.1	193.7	423.7
Indiana	36.2	131.9	131.9	300.0
Westmoreland	12.1	140.6	146.0	298.7
Western Unit	124.4	993.0	1,416.9	2,534.3
Bedford	3.1	341.5	77.1	421.7
Blair	23.3	119.0	67.3	209.6
Cambria	10.6	113.9	130.9	255.4
Fayette	.4	152.8	151.0	304.2
Somerset	.1	205.5	200.6	406.2
Southwestern Unit	37.5	932.7	626.9	1,597.1
Cameron/Potter	3.3	175.1	657.6	836.0
Elk	18.6	113.6	330.3	462.5
Forest	16.6	101.8	129.0	247.4
McKean	12.8	65.8	472.9	551.5
Sullivan	11.9	1.5	237.9	251.3
Tioga	34.6	124.8	314.2	473.6
Warren	3.8	107.5	348.6	459.9
Allegheny Unit	101.6	690.1	2,490.5	3,282.2
Centre	15.0	409.6	78.9	503.5
Clarion	64.6	88.2	64.5	217.3
Clearfield	47.1	242.7	279.3	569.1
Clinton	64.2	313.6	51.2	429.0
Jefferson	40.9	79.6	153.3	273.8
Lycoming	25.9	265.9	262.2	554.0
Venango	9.6	176.6	126.9	313.1
North-Central Unit	267.3	1,576.2	1,016.3	2,859.8
Dauphin	13.1	107.3	29.4	149.8
Franklin	16.3	149.6	33.7	199.6
Fulton	10.6	139.8	28.2	178.6
Huntingdon	29.5	287.1	68.4	385.0
Juniata/Mifflin	1.0	274.4	41.1	316.5
Perry	16.4	177.8	16.5	210.7
Snyder/Union	26.9	132.8	42.1	201.8
South-Central Unit	113.8	1,268.8	259.4	1,642.0
Bradford	31.0	104.8	245.0	380.8
Lackawanna	9.2	60.1	118.6	187.9
Susquehanna	32.7	10.5	276.8	320.0
Wayne	33.4	43.6	230.2	307.2
Wyoming	--	74.8	86.6	161.4
Northeastern Unit	106.3	293.8	957.2	1,357.3
Carbon	--	93.0	67.9	160.9
Columbia/Montour/ Northumberland	10.6	234.0	31.4	276.0
Luzerne	31.7	223.9	107.9	363.5
Monroe	20.8	168.0	95.0	283.8
Pike	9.1	248.4	15.5	273.0
Schuylkill	10.5	210.7	78.3	299.5
Pocono Unit	82.7	1,178.0	396.0	1,656.7
Adams/Cumberland/ York	22.5	287.7	44.6	354.8
Berks	--	120.1	31.5	151.6
Bucks/Lehigh/ Northampton	--	85.0	103.5	188.5
Chester/Montgomery	6.5	124.8	21.8	153.1
Lancaster/Lebanon	--	103.0	43.3	146.3
Southeastern Unit	29.0	720.6	244.7	994.3
All counties	862.6	7,653.2	7,407.9	15,923.7

[a] Multi-county groupings are used for counties with too few forested field sample plots or with other sampling anomalies. This is done when more detailed county-level data are presented in order to minimize sampling errors.
[b] Includes white pine and hemlock group, spruce fir group, and Scotch and Virginia pine group.
[c] Includes oak/pine group, oak/hickory group, and oak/gum group.
[d] Includes elm/ash/red maple group, northern hardwoods group, and aspen/birch group.

Table 74.--Net volume of growing stock on commercial forest land, by county, geographic unit, and major species group, Pennsylvania, 1978.

(In million cubic feet)

County[a] and geographic unit	Oaks	Maples	Other	Total	Sampling error[b]
Allegheny	28.8	1.6	65.9	96.3	13
Armstrong	68.4	29.0	103.0	200.4	8
Beaver/Lawrence/Mercer	135.0	59.9	116.4	311.3	8
Butler	62.7	50.6	106.6	219.9	9
Crawford	17.7	89.9	176.6	284.2	8
Erie	--	82.6	115.3	197.9	10
Greene/Washington	35.0	33.5	198.8	267.3	10
Indiana	71.8	73.6	136.9	282.3	8
Westmoreland	109.7	60.2	168.3	338.2	7
Western Unit	529.1	480.9	1,187.8	2,197.8	2.9
Bedford	316.8	98.1	126.6	541.5	6
Blair	179.5	45.1	56.0	271.6	7
Cambria	101.3	68.9	163.1	332.3	7
Fayette	122.9	52.1	117.1	292.1	9
Somerset	195.2	119.1	174.8	489.1	8
Southwestern Unit	905.7	383.3	637.6	1,926.6	3.0
Cameron/Potter	248.0	520.0	670.4	1,438.4	2
Elk	116.7	398.2	395.5	910.4	4
Forest	121.2	178.2	251.7	551.1	5
McKean	82.1	500.2	506.2	1,088.5	8
Sullivan	6.4	227.0	264.7	498.1	5
Tioga	153.2	275.7	384.8	813.7	4
Warren	137.3	332.7	484.2	954.2	4
Allegheny Unit	864.9	2,432.0	2,957.5	6,254.4	1.3
Centre	411.3	89.8	141.2	642.3	4
Clarion	115.7	52.0	87.8	255.5	9
Clearfield	226.4	150.9	272.8	650.1	5
Clinton	319.4	66.5	172.7	558.6	4
Jefferson	75.4	108.5	212.3	396.2	6
Lycoming	255.9	212.1	356.5	824.5	4
Venango	186.7	99.2	110.3	396.2	6
North-Central Unit	1,590.8	779.0	1,353.6	3,723.4	1.9
Dauphin	144.4	15.1	62.5	222.0	7
Franklin	219.7	9.6	64.7	294.0	6
Fulton	140.7	32.0	102.2	274.9	5
Huntingdon	257.3	57.0	230.8	545.1	4
Juniata/Mifflin	285.7	31.9	120.0	437.6	4
Perry	190.1	16.9	100.4	307.4	5
Snyder/Union	150.3	19.7	125.6	295.6	5
South-Central Unit	1,388.2	182.2	806.2	2,376.6	1.9
Bradford	99.3	194.4	246.2	539.9	5
Lackawanna	48.1	39.9	127.0	215.0	8
Susquehanna	23.4	185.8	226.1	435.3	5
Wayne	70.5	162.5	182.6	415.6	6
Wyoming	76.6	70.3	78.9	225.8	7
Northeastern Unit	317.9	652.9	860.8	1,831.6	2.6
Carbon	36.2	43.6	68.3	148.1	10
Columbia/Montour/ Northumberland	224.2	41.6	86.5	352.3	6
Luzerne	155.5	61.5	140.2	357.2	5
Monroe	105.4	95.5	121.0	322.3	6
Pike	211.0	56.3	75.9	343.2	4
Schuylkill	171.6	32.6	74.5	278.7	7
Pocono Unit	904.3	331.1	566.4	1,801.8	2.6
Adams/Cumberland/York	393.4	26.0	175.4	594.8	5
Berks	98.1	28.2	111.2	237.5	10
Bucks/Lehigh/ Northampton	101.9	18.7	172.7	293.3	9
Chester/Montgomery	131.9	11.4	125.8	269.1	8
Lancaster/Lebanon	115.3	34.7	99.2	249.2	9
Southeastern Unit	840.6	119.0	684.3	1,643.9	3.4
All counties	7,341.5	5,360.4	9,054.2	21,756.1	0.8

[a] Multi-county groupings are used for counties with too few forested field sample plots or with other sampling anomalies. This is done when more detailed county-level data are presented in order to minimize sampling errors.
[b] Sampling error of total.

Table 75.--Net volume of sawtimber on commercial forest land, by county, geographic unit, and major species group, Pennsylvania, 1978.

(In million board feet)

County[a] and geographic unit	Oaks	Maples	Other	Total	Sampling error[b]
Allegheny	99.1	6.9	149.7	255.7	16
Armstrong	230.5	51.2	200.3	482.0	12
Beaver/Lawrence/Mercer	488.1	128.9	260.4	877.4	8
Butler	192.7	131.2	249.7	573.6	12
Crawford	62.0	253.0	403.1	718.1	10
Erie	--	279.1	241.2	520.3	12
Greene/Washington	174.6	45.5	499.7	719.8	11
Indiana	258.1	183.1	275.6	716.8	10
Westmoreland	232.4	153.7	501.4	887.5	10
Western Unit	1,737.5	1,232.6	2,781.1	5,751.2	3.6
Bedford	890.5	230.1	345.3	1,465.9	7
Blair	409.2	67.2	112.3	588.7	12
Cambria	353.2	116.7	445.2	915.1	9
Fayette	249.8	117.1	286.8	653.7	21
Somerset	542.4	269.4	338.9	1,150.7	9
Southwestern Unit	2,445.1	800.5	1,528.5	4,774.1	4.2
Cameron/Potter	703.0	840.8	1,391.3	2,935.1	4
Elk	298.7	622.2	887.3	1,808.2	6
Forest	358.6	246.7	516.9	1,122.2	7
McKean	271.5	731.5	1,208.1	2,211.1	6
Sullivan	24.4	442.8	655.5	1,122.7	6
Tioga	514.1	459.3	771.8	1,745.2	5
Warren	469.3	539.1	1,077.6	2,086.0	5
Allegheny Unit	2,639.6	3,882.4	6,508.5	13,030.5	2.0
Centre	952.4	97.0	301.7	1,351.1	7
Clarion	374.0	109.1	174.7	657.8	11
Clearfield	579.7	240.3	577.4	1,397.4	7
Clinton	738.9	20.6	425.6	1,185.1	7
Jefferson	252.3	171.9	509.8	934.0	8
Lycoming	706.5	320.6	739.6	1,766.7	5
Venango	553.7	215.2	210.3	979.2	7
North-Central Unit	4,157.5	1,174.7	2,939.1	8,271.3	2.6
Dauphin	277.9	21.9	140.7	440.5	9
Franklin	524.8	7.4	93.7	625.9	7
Fulton	335.3	35.5	233.8	604.6	8
Huntington	644.4	48.9	455.6	1,148.9	6
Juniata/Mifflin	632.3	45.0	221.7	899.0	6
Perry	452.9	15.7	159.4	628.0	7
Snyder/Union	324.8	23.7	172.6	521.1	8
South-Central Unit	3,192.4	198.1	1,477.5	4,868.0	2.7
Bradford	181.2	250.6	504.8	936.6	6
Lackawanna	86.4	33.3	263.9	383.6	10
Susquehanna	36.5	283.1	458.9	778.5	7
Wayne	121.4	225.4	358.5	705.3	8
Wyoming	158.2	85.6	119.9	363.7	10
Northeastern Unit	583.7	878.0	1,706.0	3,167.7	3.4
Carbon	59.7	13.0	114.7	187.4	18
Columbia/Montour/ Northumberland	347.7	49.0	132.5	529.2	12
Luzerne	239.2	46.8	268.3	554.3	11
Monroe	203.6	112.1	221.5	537.2	10
Pike	379.1	34.4	154.5	568.0	7
Schuylkill	221.1	16.7	85.3	323.1	13
Pocono Unit	1,450.4	272.0	976.8	2,699.2	4.5
Adams/Cumberland/York	932.3	55.8	407.0	1,395.1	9
Berks	257.7	59.0	248.6	565.3	14
Bucks/Lehigh/ Northampton	267.0	13.5	366.8	647.3	10
Chester/Montgomery	352.2	23.9	308.0	684.1	9
Lancaster/Lebanon	245.9	88.4	237.7	572.0	11
Southeastern Unit	2,055.1	240.6	1,568.1	3,863.8	4.2
All counties	18,261.3	8,678.9	19,485.6	46,425.8	1.1

[a]Multi-county groupings are used for counties with too few forested field sample plots or with other sampling anomalies. This is done when more detailed county-level data are presented in order to minimize sampling errors.
[b]Sampling error of total.

Table 76.--Area of commercial forest land, by county and geographic unit, Pennsylvania, 1965 and 1978.

County	1965[a]	1978	Change
	---- Thousands of Acres ----		
Allegheny	165.9	129.4	-36.5
Armstrong	198.8	219.8	+21.0
Beaver	118.4	139.0	+20.6
Butler	259.9	243.5	-16.4
Crawford	367.3	322.3	-45.0
Erie	238.6	212.1	-26.5
Greene	178.9	214.2	+35.3
Indiana	284.0	300.0	+16.0
Lawrence	83.6	77.7	- 5.9
Mercer	146.3	168.1	+21.8
Washington	193.8	209.5	+15.7
Westmoreland	287.1	298.7	+11.6
Western Unit	2,522.6	2,534.3	+11.7
Bedford	430.2	421.7	- 8.5
Blair	218.2	209.6	- 8.6
Cambria	270.3	255.4	-14.9
Fayette	387.2	304.2	-83.0
Somerset	403.8	406.2	+ 2.4
Southwestern Unit	1,709.7	1,597.1	-112.6
Cameron	247.4	240.6	- 6.8
Elk	464.8	462.3	- 2.5
Forest	247.6	247.4	- 0.2
McKean	569.9	551.5	-18.4
Potter	624.5	595.5	-29.0
Sullivan	247.0	251.4	+ 4.4
Tioga	474.4	473.6	- 0.8
Warren	449.8	459.9	+10.1
Allegheny Unit	3,325.4	3,282.2	-43.2
Centre	517.2	503.5	-13.7
Clarion	212.5	217.3	+ 4.8
Clearfield	559.2	569.1	+ 9.9
Clinton	455.4	429.0	-26.4
Jefferson	267.6	273.8	+ 6.2
Lycoming	581.4	554.0	-27.4
Venango	307.3	313.1	+ 5.8
North-Central Unit	2,900.6	2,859.8	-40.8
Dauphin	157.2	149.8	- 7.4
Franklin	198.7	199.6	+ 0.9
Fulton	186.0	178.6	- 7.4
Huntingdon	407.4	385.0	-22.4
Juniata	162.1	153.4	- 8.7
Mifflin	172.6	163.1	- 9.5
Perry	224.6	210.7	-13.9
Snyder	108.7	92.4	-16.3
Union	104.1	109.4	+ 5.3
South-Central Unit	1,721.4	1,642.0	-79.4
Bradford	324.8	380.8	+56.0
Lackawanna	187.1	187.9	+ 0.8
Susquehanna	274.1	320.0	+45.9
Wayne	270.9	307.2	+36.3
Wyoming	163.8	161.4	- 2.4
Northeastern Unit	1,220.7	1,357.3	+136.6
Carbon	186.4	160.9	-25.5
Columbia	136.9	139.4	+ 2.5
Luzerne	388.9	363.5	-25.4
Monroe	287.5	283.8	- 3.7
Montour	27.9	23.6	- 4.3
Northumberland	114.6	113.0	- 1.6
Pike	304.7	273.0	-31.7
Schuylkill	316.8	299.5	-17.3
Pocono Unit	1,763.7	1,656.7	-107.0
Adams	112.3	103.8	- 8.5
Berks	159.3	151.6	- 7.7
Bucks	102.9	79.7	-23.2
Chester	105.1	87.6	-17.5
Cumberland	105.5	109.6	+ 4.1
Lancaster	95.7	96.1	+ 0.4
Lebanon	61.2	50.2	-11.0
Lehigh	51.4	52.8	+ 1.4
Montgomery	54.1	65.5	+11.4
Northampton	69.3	56.0	-13.3
York	150.0	141.4	- 8.6
Southeastern Unit	1,066.8	994.3	-72.5
All counties	16,230.9	15,923.7	-307.2

[a]These figures differ from those published in 1965 (Ferguson 19 detailed explanation of these figures appears in the analytica report on the forest resources of Pennsylvania.
W-Less than 0.5 percent.

LITERATURE CITED

ones, James T., and J.K. Sherwood.
1979. Pennsylvania timber industries--a periodic assessment of timber ouput. USDA For. Serv. Resour. Bull. NE-59. 26 p.

erguson, Roland H.
1968. The timber resources of Pennsylvania. USDA For. Serv. Resour. Bull. NE-8. 147 p.

APPENDIX

efinition of terms

Accretion. The estimated net growth of owing-stock trees that were measured during e previous inventory, divided by the length f the period between surveys. It includes e growth on trees that were cut during the eriod, plus those trees that died and were ed.

Annual mortality trend-level. The estima- d mortality of growing stock or sawtimber r a specific year (1977 for Pennsylvania) sed on average rates of diameter growth and rtality for the period. This estimate is nsistent with the average annual change ring the period between surveys and with the rrent inventory.

Annual net growth trend-level. The esti- ted growth of growing stock or sawtimber for specific year (1977 for Pennsylvania) based on erage rates of diameter growth and mortality r the period. This estimate is consistent th the average annual change during the riod between surveys and with the current ventory.

Annual removals trend-level. The esti- ted removals of growing stock or sawtimber r a specific year (1977 for Pennsylvania) tained from a trend line for the period. is line is established by fitting a curve actual removals data for several years ring the period. The actual removals for e year given can vary from the trend esti- te because of fluctuations in market con- tions and other factors.

Average annual net growth. The change, sulting from natural causes, in growing- ock or sawtimber volume of sound wood in owing-stock or sawtimber trees during the riod between surveys, divided by the length the period. Components of average annual t growth include the increment in net lume of trees that are present at the ginning of the period and that survive to e end (accretion), plus average annual growth, minus average annual mortality, and nus the net volume of trees that became gh or rotten during the period (cull crement).

Average annual removals. The net growing-stock or sawtimber volume of trees harvested or killed in logging, cultural operations--such as timber stand improvement--or land clearing, and also the net growing-stock or sawtimber volume of trees neither harvested nor killed but growing on land which was reclassified from commercial forest land to noncommercial forest land during the period between surveys. This volume is divided by the length of the period.

Board foot. A unit of lumber measurement 1 foot long, 1 foot wide, and 1 inch thick, or its equivalent.

Coarse residues. Manufacturing residues suitable for chipping, such as slabs, edgings, and veneer cores.

Commercial forest land. Forest land producing or capable of producing crops of industrial wood (more than 20 cubic feet per acre per year) and not withdrawn from timber utilization.

Commercial species. Tree species presently or prospectively suitable for industrial wood products. Excludes species of typically small size, poor form, or inferior quality, such as hawthorn and sumac.

County and municipal lands. Lands owned by counties and local public agencies or municipalities or leased to them for 50 years or more.

Cull increment. The net volume of growing-stock trees on the previous inventory that became rough or rotten trees in the current inventory, divided by the length of the period between surveys.

Diameter at breast height (dbh). The diameter outside bark of a standing tree measured at 4-1/2 feet above the ground.

Farmer-owned lands. Lands owned by farm operators, whether part of the farmstead or not. Excludes land leased by farm operators from nonfarm owners.

Federal lands. Lands (other than National Forests) administered by Federal agencies.

Fine residues. Manufacturing residues not suitable for chipping, such as sawdust and shavings.

Forest industry lands. Lands owned by companies or individuals operating primary wood-using plants.

Forest land. Land at least 10 percent stocked with trees of any size or that formerly had such tree cover and is not

currently developed for nonforest use. The minimum area for classification of forest land is 1 acre.

Forest type. A classification of forest land based on the species forming a plurality of live-tree stocking. The many forest types in Pennsylvania were combined into the following major forest-type groups:

a. White pine and hemlock--forests in which white pine, red pine, or hemlock, singly or in combination, comprise a plurality of the stocking; in Pennsylvania common associates include red maple, red oaks, white oaks, beech, black cherry, and aspen.

b. Spruce/fir--forests in which spruce, fir, or tamarack, singly or in combination, comprise a plurality of the stocking; this type is rare and localized in Pennsylvania.

c. Scotch and Virginia pine--forests in which Scotch, Virginia, or pitch pines or eastern redcedar, singly or in combination, comprise a plurality of the stocking; in Pennsylvania common associates include white pine, oak, yellow-poplar, and white ash.

d. Oak/pine--forests in which hardwoods (usually white, scarlet, chestnut, northern red, or black oaks) comprise a plurality of the stocking but where Scotch, Virginia, or pitch pines or eastern redcedar comprise 25 to 50 percent of the stocking; in Pennsylvania common associates besides those listed above include red maple, black cherry, and hickory.

e. Oak/hickory--forests in which upland oaks, hickory, yellow-poplar, black walnut, or red maple (when associated with central hardwoods), singly or in combination, comprise a plurality of the stocking and in which Scotch, Virginia, or pitch pines or eastern redcedar comprise less than 25 percent of the stocking; in Pennsylvania common associates include white ash, sweet birch, black cherry, black locust, and sugar maple.

f. Oak/gum--bottomland forests in which wet-site oaks or gums, singly or in combination, comprise a plurality of the stocking; in Pennsylvania, our survey encountered only one field plot in this group, and it was dominated by swamp white oak and had associates of quaking aspen, black cherry, red maple, and white ash.

g. Elm/ash/red maple--forests in which elm, river birch, sycamore, willow, or red maple (when growing on wet sites), singly or in combination, comprise a plurality of the stocking; in Pennsylvania common associates include red oaks, white oaks, hickory, black cherry, white ash, and sugar maple.

h. Northern hardwoods--forests in which sugar maple, beech, yellow birch, black cherry, or red maple (when associated with northern hardwoods), singly or in combination, comprise a plurality of the stocking; in Pennsylvania common associates include white ash,hemlock, sweet birch, northern red oak, basswood, aspen, white oak, white pine, and hickory.

i. Aspen/birch--forests in which aspen,paper birch, or gray birch, singly or in combination, comprise a plurality of the stocking; in Pennsylvania common associates include red maple, black cherry, sugar maple, and oak.

Growing-stock trees. Live trees of commercial species classified as sawtimber, poletimber, saplings, and seedlings; that is, all live trees of commercial species except rough and rotten trees.

Growing-stock volume. Net volume, in cubic feet of growing-stock trees 5.0 inches dbh and larger, from a 1-foot stump to a minimum 4.0-inch top diameter outside bark of the central stem, or to the point where the central stem breaks into limbs. Net volume equals gross volume, less deduction for cull.

Hardwoods. Dicotyledonous trees, usually broad-leaved and deciduous.

Industrial wood. All roundwood products except fuelwood.

Ingrowth. The estimated net volume of growing stock trees that became 5.0 inches dbh or larger during the period between inventories, divided by the length of the period between surveys.

International 1/4-inch rule. A log rule, or formula, for estimating the board-foot volume of logs. The mathematical formula is:

$$(0.22D^2 - 0.71D)(0.904762)$$

for 4-foot sections, where D = diameter inside bark at the small end of the section. This rule is used as the USDA Forest Service Standard Log rule in the eastern United States.

Land area. (a) Bureau of Census: The area of dry land and land temporarily or partly covered by water, such as marshes, swamps, and river flood plains; streams, sloughs, estuaries, and canals less than 1/8 statute mile wide; and lakes, reservoirs,

nd ponds less than 40 acres in area. (b) esources Evaluation: same as (a) except nat the minimum width of streams, etc., is 20 feet, and the minimum size of lakes, tc., is 1 acre.

Logging residues. The unused portions f growing-stock trees harvested or killed n the process of logging.

Manufacturing plant residues. Wood aterials that are generated when converting ound timber (roundwood) into wood products. his includes slabs, edgings, trimmings, scuts, sawdust, shavings, veneer cores and ippings, and pulp screening. If these sidues are used, they are referred to as ant byproducts.

Miscellaneous private lands. Privately ned lands other than forest-industry and rmer-owned lands.

Mortality. The estimated net volume of owing-stock trees on the previous inven- ry that died from natural causes before e current inventory, divided by the length the period between surveys.

National Forest lands. Federal lands gally designated as National Forests or rchase units and other lands administered part of the National Forest System by the DA Forest Service.

Noncommercial forest land. Productive- served, urban, and unproductive forest nd.

Noncommercial species. Tree species of pically small size, poor form, or inferior ality that normally do not develop into ees suitable for industrial wood products.

Nonforest land. Land that has never pported forests, or land formerly forested t now in nonforest use such as cropland, sture, residential areas, and highways.

Nonstocked areas. Commercial forest nd that is stocked with less than 10 percent minimun full stocking with growing-stock ees.

Plant byproducts. Wood products, such pulp chips, recycled from manufacturing ant residues.

Poletimber stands. Stands stocked with least 10 percent of minimum full stocking th growing-stock trees with half or more of ch stocking in poletimber or sawtimber ees or both,and in which the stocking of letimber exceeds that of sawtimber.

Poletimber trees. Live trees of commer- al species meeting regional specifications of soundness and form and at least 5.0 inches in dbh, but smaller than sawtimber trees.

Productive-reserved forest land. Forest land sufficiently productive to qualify as commercial forest land, but withdrawn from timber utilization through statute, administrative designation, or exclusive use for Christmas tree production.

Primary wood manufacturing plant. A plant that converts round timber into wood products such as woodpulp, lumber, veneer, cooperage, and dimension products.

Pulpwood. Roundwood converted into 4- or 5-foot lengths or chips, and chipped plant byproducts that are prepared for manufacture into woodpulp.

Rotten trees. Live trees of commercial species that do not contain at least one 12-foot sawlog or two noncontiguous sawlogs, each 8 feet or longer, now or prospectively, and do not meet regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of the cull volume in a tree is rotten.

Rough trees. (a) The same as rotten trees, except that rough trees do not meet regional specifications for freedom from defect primarily because of roughness or poor form, and (b) all live trees of noncommercial species.

Roundwood products. Logs, bolts, or other round timber generated by harvesting trees for industrial or consumer uses.

Saplings. Live trees 1.0 through 4.9 inches dbh.

Sapling-seedling stands. Stands stocked with at least 10 percent of minimum full stocking with growing-stock trees with half or more of such stocking in saplings or seedlings or both.

Sawlog. A log meeting regional standards of diameter, length, and defect, including a minimum 8-foot length and a minimum diameter inside bark of 6 inches for softwoods and 8 inches for hardwoods. (See specifications under Log Grade Classification.)

Sawlog portion. That part of the bole of a sawtimber tree between the stump and the sawlog top; that is, the merchantable height.

Sawlog top. The point on the bole of a sawtimber tree above which a sawlog cannot be produced. The minimum sawlog top is

7.0 inches diameter outside bark (dob) for softwoods and 9.0 inches dob for hardwoods.

Sawtimber stands. Stands stocked with at least 10 percent of minimum full stocking with growing-stock trees with half or more of such stocking in poletimber or sawtimber trees or both, and in which the stocking of sawtimber is at least equal to that of poletimber.

Sawtimber trees. Live trees of commercial species at least 9.0 inches dbh for softwoods or 11.0 inches for hardwoods containing at least one 12-foot sawlog or two noncontiguous 8-foot sawlogs, and meeting regional specifications for freedom from defect.

Sawtimber volume. Net volume in board feet, International 1/4-inch rule, of sawlogs in sawtimber trees. Net volume equals gross volume less deductions for rot, sweep, and other defects that affect use for lumber.

Seedlings. Live trees less than 1.0 inch dbh that are expected to survive.

Site class. A classification of forest land in terms of inherent capacity to grow crops of industrial wood. Classifications are based on the mean annual growth of growing-stock trees attainable in fully stocked natural stands at culmination of mean annual increment.

Softwoods. Coniferous trees, usually evergreen and having needles or scalelike leaves.

Stand. A group of forest trees growing on forest land.

Stand-size class. A classification of forest land based on the size class (that is, seedlings, saplings, poletimber, or sawtimber) of growing-stock trees in the area.

Standard cord. A unit of measure for stacked bolts of wood, encompassing 128 cubic feet of wood, bark, and air space. Fuelwood cord estimates can be derived from cubic-foot estimates of growing stock by applying an average factor of 80 cubic feet of solid wood per cord. For pulpwood, a conversion of 85 cubic feet of solid wood per cord is used because of the more uniform character of pulpwood.

State lands. Lands owned by the State or leased to the State for 50 years or more.

Stocking. The degree of occupancy of land by trees, measured by basal area and/or number of trees in a stand compared to the basal area and/or number of trees required to fully use the growth potential of the land (or the stocking standard). In the eastern United States this standard is 75 square feet of basal area per acre for trees 5.0 inches dbh and larger, or its equivalent in numbers o trees per acre for seedlings and saplings.

Two categories of stocking are used:

All live trees - these are used to classify forest land and forest types.

Growing-stock trees - these are used to classify stand-size classes.

Timber products. Manufacturing plant byproducts and roundwood (round timber) products harvested from growing-stock trees on commercial forest land; from other sources, such as cull trees, salvable dead trees, limbs, tops and saplings; and from trees on noncommercial forest and nonforest lands.

Timber removals. The growing-stock or sawtimber volumes of trees removed from the inventory for roundwood products, plus logging residues, volume destroyed during land clearing, and volume of standing trees growing on land that was reclassified from commercial forest land to noncommercial forest land. (See Table 29).

Trees. Woody plants that have well-developed stems and are usually more than 12 feet in height at maturity.

Unproductive forest land. Forest land that is incapable of producing 20 cubic feet per acre per year of industrial wood under natural conditions, because of adverse site conditions.

Unused manufacturing residues. Plant residues that are dumped or destroyed and not recovered for plant byproducts.

Upper-stem portion. That part of the main stem or fork of a sawtimber tree above the sawlog top to a diameter of 4.0 inches outside bark or to the point where the main stem or fork breaks into limbs.

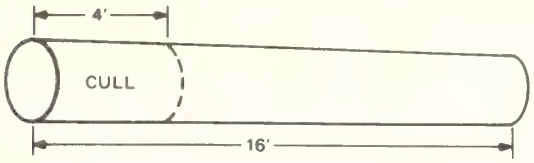
Urban forest land. Noncommercial forest land within urban areas that is completely surrounded by urban development (not parks), whether commercial, industrial, or residential.

Log-grade classification

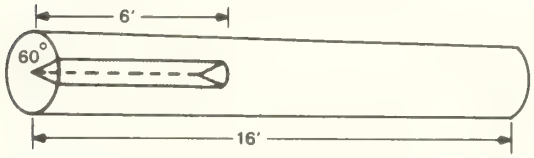
Log grades are a classification of logs based on external characteristics as indicators of quality or value. The log-grade standards and grading systems for softwoods and hardwoods used in this forest survey are shown in the following specifications:

Methods of determining scaling deduction.

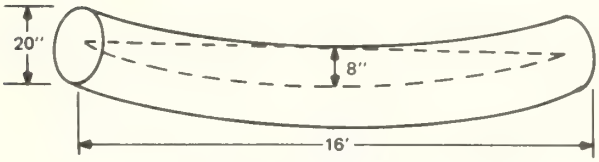
(Examples based on a 16-foot log with 20-inch scaling diameter)



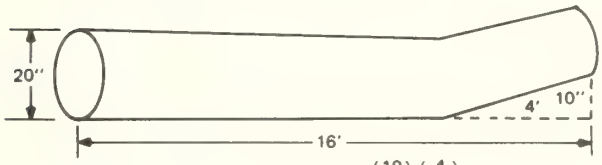
Defect section (rule 1): Percent deduction = $\frac{4}{16}$ = 25%



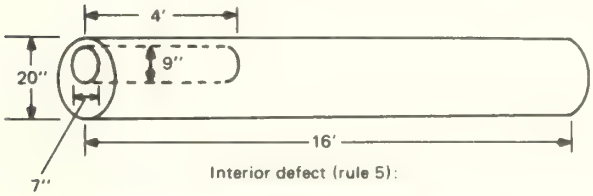
Defect section (rule 2): Percent deduction = $\left(\frac{6}{16}\right)\left(\frac{60}{360}\right)$ = 6-1/4%



Sweep (rule 3): Percent deduction = $\frac{8 \cdot 2}{20}$ = 30%



Crook (rule 4): Percent deduction = $\left(\frac{10}{20}\right)\left(\frac{4}{16}\right)$ = 12-1/2%



Interior defect (rule 5):

Percent deduction = $\frac{(8)\,(10)}{(20-1)^2} \times \frac{4}{16}$ = 5-5/9%

In practice each elipse axis can be divided by (20–1)

Thus $\frac{8}{19}$ = .4, $\frac{10}{19}$ .5, and (.4) (.5) $\left(\frac{4}{16}\right)$ = 5%

From: Grosenbaugh, L.R. 1952. Shortcuts for cruisers and scalers. U.S. Dep, Agric. For. Serv. South. For Exp. Stn. Occas. Pap. 126.

STANDARD GRADES FOR HARDWOOD FACTORY LUMBER LOGS

Grading Factors		Log grades							
		F1			F2				F3
Position in tree		Butts only	Butts & uppers		Butts & Uppers				Butts & uppers
Scaling diameter, inches		13-15[a]	16-19	20+	11+[b]	12+			8+
Length without trim, feet		10+			10+	8-9	10-11	12+	8+
Required clear cuttings[c] of each of 3 best faces[d]	Min. length, feet	7	5	3	3	3	3	3	2
	Max. number	2	2	2	2	2	2	3	No limit
	Min. proportion of log length required in clear cutting	5/6	5/6	5/6	2/3	3/4	2/3	2/3	1/2
Maximum sweep & crook allowance	For logs with less than ¼ of end in sound defects	15%			30%				50%
	For logs with more than ¼ of end in sound defects	10%			20%				35%
Maximum scaling	deduction	40%[e]			50%[f]				50%

End defects although not visible in standing trees, are important in grading cut logs. Instructions for dealing with this factor are contained in Forest Prod. Lab. Rpt. D 1737.

[a]Ash and basswood butts can be 12 inches if they otherwise meet requirements for small #1's.

[b]Ten-inch logs of all species can be #2 if they otherwise meet requirements for small #1's.

[c]A clear cutting is the portion of a face, extending the width of the face, that is free of defects.

[d]A face is ¼ of the surface of the log as divided lengthwise.

[e]Otherwise #1 logs with 41-60% deductions can be #2.

[f]Otherwise #2 logs with 51-60% deductions can be #3.

From: Vaughan, C. L., A. C. Wollin, K. A. McDonald, and E. H. Bulgrin. 1966. Hardwood log grades for standard lumber. USDA For. Serv. Res. Pap. FPL-63.

STANDARD SPECIFICATIONS FOR HARDWOOD CONSTRUCTION LOGS.[a]

Position in tree		Butt & upper
Min. diameter, small end		8 inches +
Min. length, without trim		8 feet
Clear cuttings		No requirements.
Sweep allowance, absolute		1/4 diameter small end for each 8 feet of length.
Sound surface defects	Single knots	Any number, if no one knot has an average diameter above the callus in excess of 1/3 of log diameter at point of occurrence.
	Whorled knots	Any number if sum of knot diameters above the callus does not exceed 1/3 of log diameter at point of occurrence.
	Holes	Any number provided none has a diameter over 1/3 of log diameter at point of occurrence, and none extends over 3 inches into included timber.[b]
Unsound surface defects		Same requirements as for sound defects if they extend into included timber.[b] No limit if they do not.
End defects	Sound	No requirements.
	Unsound	None allowed; log must be sound internally, but will admit 1 shake not to exceed 1/4 the scaling diameter and a longitudinal split not extending over 5 inches into the contained timber.

[a]These specifications are minimum for the class. If, from a group of logs, factory logs are selected first, thus leaving only non-factory logs from which to select construction logs, then the quality range of the construction logs so selected is limited, and the class may be considered a grade. If selection for construction logs is given first priority, then it may be necessary to subdivide the class into grades.

[b]Included timber is always square, and dimension is judged from small end.

From: Rast, E. D., D. L. Sonderman, and G. L. Gammon. 1973. A guide to hardwood log grading (Revised). USDA For. Serv. Gen. Tech. Rep. NE-1.

EASTERN WHITE PINE SAWLOG GRADE SPECIFICATIONS

GRADING FACTOR	LOG GRADE 1	LOG GRADE 2	LOG GRADE 3	LOG GRADE 4
(1) MINIMUM SCALING DIAMETER (inches)	14[1]	6	6	6
(2) MINIMUM LOG LENGTH (feet)	10[2]	8	8	8
(3) MAXIMUM WEEVIL INJURY (number)	None	None	2 injuries[3]	No limit
(4) MINIMUM FACE REQUIREMENTS	Two full length or four 50% length good faces.[4] (In addition, log knots on balance of faces shall not exceed size limitations of grade 2 logs.)	No GOOD FACES REQUIRED Maximum diameter of log knots on three best faces SOUND RED KNOTS not to exceed 1/6 scaling diameter and 3 inch maximum DEAD OR BLACK KNOTS including overgrown knots not to exceed 1/12 scaling diameter and 1½ inch maximum.	SOUND RED KNOTS not to exceed 1/3 scaling diameter and 5 inch maximum DEAD OR BLACK KNOTS including overgrown knots not to exceed 1/6 scaling diameter and 2½ inch maximum.	Includes all logs not qualifying for No. 3 or better and judged to have at least one-third of their gross volume in sound wood suitable for manufacture into standard lumber
(5) MAXIMUM SWEEP OR CROOK ALLOWANCE (percent)	20	30	40	66⅔
(6) MAXIMUM TOTAL SCALING DEDUCTION (percent)	50	50	50	66⅔

After the tentative log grade is established from face examination, the log will be reduced in grade whenever the following defects are evident.

(7) CONKS, PUNK KNOTS, AND PINE BORER DAMAGE ON BARK SURFACE[5]

Degrade one grade if present on one face.
Degrade two grades if present on two faces.
Degrade three grades if present on three or more faces

(8) LOG END DEFECTS: RED ROT, RING SHAKE, HEAVY STAIN AND PINE BORER DAMAGE OUTSIDE HEART CENTER OF LOG[5]

Consider log as having a total of 8 quarters (4 on each end) and degrade as indicated below:
Degrade one grade if present in 2 quarters of log ends
Degrade two grades if present in 3 or 4 quarters of log ends
Degrade three grades if present in 5 or more quarters of log ends

[1]12 and 13 inch logs with four full length good faces are acceptable
[2]8 foot logs with four full length good faces are acceptable
[3]8 foot No. 3 logs limited to one weevil injury
[4]Minimum 50% length good face must be at least 6 feet
[5]Factors 7 and 8 are not cumulative (total degrade based on more serious of the two). No log to be degraded below grade 4 if net scale is at least one-third gross log scale

From: Ostrander, M. D., and R. L. Brisbin, 1971. Sawlog grades for eastern white pine. USDA For. Serv. Res. Pap. NE-205.

SOUTHERN PINE SAWLOGS

Grade 1. Logs with 3 or 4 clear faces.[1] Code 1.

Grade 2. Logs with 1 or 2 clear faces. Code 2.

Grade 3. Logs with no clear faces. Code 3.

After the tentative log grade is established from above, the log will be degraded one grade for each of the following, except that no log can be degraded below grade 3.

1. *Sweep.* Degrade any tentative 1 or 2 log one grade if sweep amounts to 3 or more inches and equals or exceeds one third (1/3) the diameter inside bark at small end. This is the final grade if there is no evidence of heart rot.

2. *Heart rot.* Degrade any tentative 1 or 2 log one grade if conk, massed hyphae, or other evidence of advanced heart rot is found anywhere in it.

[1] A face is one-fourth of the circumference in width extending full length of the log. Clear faces are those free of: knots measuring more than one-half inch in diameter, overgrown knots of any size, holes more than one-fourth inch in diameter. The faces may be rotated if necessary to obtain the maximum number of clear ones.

From: Schroeder, J. G., R. A. Campbell, and R. C. Rodenbach. 1968. Southern pine sawlogs for yard and structural lumber. USDA For. Serv. Res. Pap. SE-39.

Commercial tree species of Pennsylvania

Scientific Name[a]	Common Name	Occurrence[b]
	SOFTWOODS	
Juniperus virginiana	eastern redcedar	vr
Larix laricina	tamarack (eastern larch)[c]	r
Picea abies	Norway spruce[d]	r
P. glauca	white spruce[d]	vr
P. mariana	black spruce	vr
P. rubens	red spruce	vr
Pinus banksiana	jack pine[d]	r
P. echinata	shortleaf pine	vr
P. pungens	Table-Mountain pine	vr
P. resinosa	red pine	c
P. rigida	pitch pine	c
P. strobus	eastern white pine	c
P. sylvestris	Scotch pine[d]	c
P. virginiana	Virginia pine	c
Tsuga canadensis	eastern hemlock	vc
	HARDWOODS	
Acer rubrum	red maple (soft)[c]	vc
A. saccharinum	silver maple	r
A. saccharum	sugar maple (hard)[c]	vc
Betula alleghaniensis	yellow birch	c
B. lenta	sweet birch (black)[c]	c
B. nigra	river birch	vr
B. papyrifera	paper birch(white)[c]	r
Carya spp.	hickory	c
Castanea dentata	American chestnut	vr
Celtis occidentalis	hackberry	vr
Cornus florida	flowering dogwood	r
Diospyros virginiana	common persimmon	vr
Fagus grandifolia	American beech	c
Fraxinus americana	white ash	c
F. nigra	black ash	vr
F. pennsylvanica	green ash	r
Gleditsia triacanthos	honeylocust	vr
Gymnocladus dioicus	Kentucky coffeetree	vr
Ilex opaca	American holly	vr
Juglans cinerea	butternut	r
J. nigra	black walnut	r

Liquidambar styraciflua	sweetgum (red gum)[c]	vr
Liriodendron tulipifera	yellow-poplar (tulip tree)[c]	c
Magnolia acuminata	cucumber tree	r
Nyssa sylvatica	blackgum (black tupelo)[c]	c
Platanus occidentalis	American sycamore	r
Populus deltoides	eastern cottonwood	vr
P. grandidentata	bigtooth aspen	c
P. tremuloides	quaking aspen	c
Prunus serotina	black cherry	vc
Quercus alba	white oak	vc
Q. bicolor	swamp white oak	r
Q. coccinea	scarlet oak	c
Q. falcata var. *falcata*	southern red oak	vr
Q. imbricaria	shingle oak	vr
Q. macrocarpa	bur oak	vr
Q. muehlenbergii	chinkapin oak	vr
Q. palustris	pin oak	r
Q. phellos	willow oak	vr
Q. prinus	chestnut oak	vc
Q. rubra	northern red oak	vc
Q. stellata var. *stellata*	post oak	vr
Q. velutina	black oak	c
Robinia pseudoacacia	black locust	c
Salix nigra	black willow	vr
Tilia americana	American basswood	c
Ulmus americana	American elm	c
U. rubra	slippery elm	c
U. thomasii	rock elm	r

---

[a]Names according to: Little, Elbert L., Jr. 1979. Checklist of United States trees (native and naturalized). U.S. Dep. Agric., Agric. Handb. 541. Washington, D.C. 375 p.

[b]Occurrence is based on the frequency of tally of commercial species 5.0 inches dbh or larger on forest survey field plots: vr - very rare (<0.05%), r - rare (0.05 to 0.49%), c - common (0.5 to 4.9%), and vc - very common (>5.0%).

[c]Names in parentheses are other frequently used names.

[d]Species introduced into Pennsylvania.

Metric equivalents of units used in this report

1 acre = 4,046.86 square meters or 0.404686 hectares
1,000 acres = 404.686 hectares
1,000,000 acres = 404,686 hectares
1,000 board feet = 3.48 meters[a]
1 cubic foot = 0.028317 cubic meters
1,000 cubic feet = 28.317 cubic meters
1,000,000 cubic feet = 28,317 cubic meters
1 cord (wood, bark, and airspace) = 3.6246 cubic meters
1 cord (solid wood, pulpwood) = 2.4069 cubic meters
1 cord (solid wood, other than pulpwood) = 2.2654 cubic meters
1,000 cords (pulpwood) = 2,406.9 cubic meters
1,000 cords (other products) = 2,265.4 cubic meters
1 inch = 2.54 centimeters or 0.0254 meters
1 foot = 30.48 centimeters or 0.3048 meters
Breast height = 1.4 meters above ground level
1 mile = 1.609 kilometers
1 square foot = 929.03 square centimeters or 0.0929 square meters
1 square foot per acre basal area = 0.229568 square meters per hectare

---

[a]While 1,000 board feet is theoretically equivalent to 2.36 cubic meters, this is true only when a board foot is actually a piece of wood with a volume 1/12 of a cubic foot. The International 1/4-inch log rule is used by the USDA Forest Service in the East to estimate the product potential in board feet. The reliability of the estimate, using a conversion, will vary with the size of the log measure. The conversion given here, 3.48 cubic meters, is based on the cubic volume of a log 16 feet long and 15 inches in diameter inside bark (dib) at the small end. This conversion could be used for average comparisons when accuracy of 10 percent is acceptable. Since the board foot unit is not a true measure of wood volume and since products other than dimension lumber are becoming important, this unit may eventually be phased out and replaced with the cubic meter unit.

Considine, Thomas J., Jr., and Douglas S. Powell.

1980. Forest Statistics for Pennsylvania--1980.
Northeast. For. Exp. Stn., Broomall, Pa. 88 p.
(USDA For. Serv. Resour. Bull. NE-65)

A statistical report on the third forest survey of Pennsylvania conducted in 1977 and 1978. Statistical findings are based on data from remeasured 1/5-acre plots and both remeasured and new 10-point variable-radius plots. The current status of forestland area, timber volume, and annual growth and removals is presented. Timber products output by timber industries, based on a 1976 updated canvass of manufacturers, is presented.

ODC 905.1 (748)

Keywords: Forest survey, area, volume, growth, removals, counties.

Headquarters of the Northeastern Forest Experiment Station are in Broomall, Pa. Field laboratories and research units are maintained at:

- Amherst, Massachusetts, in cooperation with the University of Massachusetts.
- Beltsville, Maryland.
- Berea, Kentucky, in cooperation with Berea College.
- Burlington, Vermont, in cooperation with the University of Vermont.
- Delaware, Ohio.
- Durham, New Hampshire, in cooperation with the University of New Hampshire.
- Hamden, Connecticut, in cooperation with Yale University.
- Kingston, Pennsylvania.
- Morgantown, West Virginia, in cooperation with West Virginia University, Morgantown.
- Orono, Maine, in cooperation with the University of Maine, Orono.
- Parsons, West Virginia.
- Princeton, West Virginia.
- Syracuse, New York, in cooperation with the State University of New York College of Environmental Sciences and Forestry at Syracuse University, Syracuse.
- University Park, Pennsylvania, in cooperation with the Pennsylvania State University.
- Warren, Pennsylvania.